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THE

AMERICAN CYCLOPÆDIA.

VOL. I.

A–ASHER.

THE

AMERICAN CYCLOPÆDIA:

A

Popular Dictionary

OF

GENERAL KNOWLEDGE.

EDITED BY

GEORGE RIPLEY AND CHARLES A. DANA.

WITH SUPPLEMENT.

VOLUME I.

A—ASHER.

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PREFACE.

The work originally published under the title of The New American Cyclopædia was completed in 1863, since which time the wide circulation which it has attained in all parts of the United States, and the signal developments which have taken place in every branch of science, literature, and art, have induced the editors and publishers to submit it to an exact and thorough revision, and to issue a new edition entitled The American Cyclopædia.

Within the last ten years the progress of discovery in every department of knowledge has made a new work of reference an imperative want. The physical sciences have revealed unexpected and important relations in the material world. Chemistry and physiology have been well nigh reconstructed. Light, heat, and force are now subjected to new processes of study, with results truly astonishing. The elements of matter have undergone a fresh analysis, and are arranged in new classifications; the spectroscope has made known the intimate composition of the stars, and opened the secular history of the sun; while the researches of the physiologist and the microscopist have won brilliant victories in the field of animated nature. No less remarkable advances have been made in ethnology, archæology, and history. The records of antiquity have received a new interpretation, and a wonderful light has been thrown upon the annals of our race.

The movement of political affairs has kept pace with the discoveries of science, and their fruitful application to the industrial and useful arts and the convenience and refinement of social life. Great wars and consequent revolutions have occurred, involving national changes of peculiar moment. The civil war of our own country, which was at its height when our last volume appeared, has happily been ended, and a new course of commercial and industrial activity has been commenced. The second French empire has perished, and the third French republic has been proclaimed amid the perturbations of one of the greatest conflicts described in history. A new German empire has been created by the same mighty convulsion; the Spanish monarchy has fallen, and a republic for the first time has been founded on Spanish soil. Austria, defeated by Prussia, has been reconstructed on a new basis. Italy has been united in one kingdom, with Rome for its capital, and the temporal power of the Pope completely overthrown. Japan has experienced one of the most remarkable of revolutions, and significant changes have occurred in China and in other parts of Asia. Large accessions to our geographical knowledge have been made by the indefatigable explorers of Africa, and a new impulse has been given to human activity on that continent by the discovery of gold and diamonds.

The great political revolutions of the last decade, with the natural result of the lapse of time, have brought into public view a multitude of new men, whose names are in every one's mouth, and of whose lives every one is curious to know the particulars. Great battles have been fought and important sieges maintained, of which the details are as yet preserved only in the newspapers or in the transient publications of the day, but which ought now to take their place in permanent and authentic history. Since the completion of our first edition, the decennial censuses of the United States and of Great Britain have been taken, as well as many other censuses throughout the world, and the statistics of population, commerce, manufactures, and other branches of industry, that were correct at that time, have been superseded by new material.

In preparing the present edition for the press, it has accordingly been the aim of the editors to bring down the information to the latest possible dates, and to furnish an accurate account of the most recent discoveries in science, of every fresh production in literature, and of the newest inventions in the practical arts, as well as to give a succinct and original record of the progress of political and historical events.

The work has been begun after long and careful preliminary labor, and with the most ample resources for carrying it on to a successful termination. Several of the most experienced and competent of the writers of the original work have been employed as revisers, and the assistance of new contributors of eminent distinction in their respective departments has been secured, in addition to that of members of the former corps. Only such portions of the original matter have been retained as were found to be in accordance with the existing state of knowledge; every statement has been compared with the latest authorities; every error that could be discovered by the most careful scrutiny has been corrected; many emendations in arrangement and style have been introduced; all apparent superfluities in subject and treatment have been retrenched; a multiplicity of new titles, most of which have sprung up since the issue of the first edition, have been added; while those which have become obsolete, or which were found to have lost most of their former importance, have been made to give place to others of fresher interest and unquestionable value. None of the original stereotype plates have been used, but every page has been printed on new type, forming in fact a new Cyclopædia, with the same plan and compass as its predecessor, but with a far greater pecuniary expenditure, and with such improvements in its composition as have been suggested by longer experience and enlarged knowledge.

The illustrations which are introduced for the first time in the present edition have been added not for the sake of pictorial effect, but to give greater lucidity and force to the explanations in the text. They embrace all branches of science and of natural history, and depict the most famous and remarkable features of scenery, architecture, and art, as well as the various processes of mechanics and manufactures. Although intended for instruction rather than embellishment, no pains have been spared to insure their artistic excellence; the cost of their execution is enormous, and it is believed they will find a welcome reception as an admirable feature of the Cyclopædia, and worthy of its high character.

The design of The American Cyclopædia, then, as it was that of the original work on which it is founded, is to furnish a condensed exhibition of the present state of human knowledge on the most important subjects of inquiry. The discussion of the controverted points of science, philosophy, religion, or politics does not enter within its plan; but it aims exclusively at an accurate and impartial account of the development of opinion in the exercise of thought, of the results of investigation in every department of science, of the prominent events in the history of the world, of the most significant productions of literature and art, and of the celebrated individuals whose names are associated with the phenomena of their age.

In preparing the materials of the work, neither the editors nor their collaborators have attempted to make it a vehicle for the expression of personal notions. As far as was consistent with the nature of the case, they have confined themselves to the historical relation of facts, without assuming the function of advocates or judges. In instances which seemed to demand a positive verdict, they have endeavored to present an illustration of evidence rather than an exhibition of argument. Each subject has been treated in the point of view of those with whom it is a specialty, and not in that of indifferent or hostile observers. In order to secure the most complete justice in this respect, the various articles in the work have been intrusted, as far as possible, to writers whose studies, position, opinions, and tastes were a guarantee of their thorough information, and furnished a presumption of their fairness and impartiality.

In a work primarily intended for popular instruction and entertainment, it is obvious that elaborate treatises on the subjects which are brought forward in its pages would be inappropriate. Hence no attempt has been made to furnish the masters of literature and science with new facts or principles in their peculiar branches of study. On the contrary, the editors have only sought to present such selections from the universal treasury of knowledge as will place the cultivators of one department of research in possession of the achievements of other departments, and especially to spread before the great mass of intelligent readers a faithful report of the opinions, systems, discoveries, events, actions, and characters that make up the history of the world.

A popular method, however, has not been pursued at the expense of thoroughness of research and copiousness of statement in regard to topics which seemed to demand a more extended treatment. Ample space has been allotted to articles of this character, especially on subjects connected with modern scientific discoveries, mechanical and industrial inventions, the principles of physiology and hygiene, and American and European history, biography, and geography. Several of our titles in those divisions are treated with a fulness of detail, and present a variety as well as an exactness of information, which it is believed will entitle them to the rank of standard authorities.

While the brevity that has been observed on points of secondary interest has enabled the editors to give a greater number of titles than is usual in productions of similar intent, they have rigidly excluded those which would increase the size of the work without enhancing its value. The terms which require only the common dictionary definitions, and the proper names which fill an unimportant place in gazetteers and biographical dictionaries, have been rejected on system.

The materials which have served as a foundation for the work have been derived from a great variety of sources. Besides the standard works on special subjects, scientific, literary, or historical, the numerous encyclopædias, dictionaries of the various branches of study, and popular conversations-lexicons, in which the literature of the last quarter of a century is so singularly rich, have been diligently consulted and compared. Their contributions to the common stock of knowledge have furnished many valuable facts, statements, and suggestions; while recent biographies, histories, books of travel, scientific treatises, statistical reports, and the current journals and periodical literature of the day have been put in constant requisition, and their contents carefully digested and utilized.

A great mass of important information has been derived from consultation with practical men in different branches of manufactures and other industrial processes; public officials have liberally supplied us with data from their archives; the representatives of science have imparted to us the results of their experience; the constructors of great works of internal improvement now in progress have favored us with the explanation of their methods and plans; the journalists throughout the country have promptly responded to our request for facts in their respective localities; while many of the writers employed upon the work have enriched it with the fruit of their personal researches, observations, and discoveries in the branches of learning in which their names have attained an honorable distinction.

The editors of this Cyclopædia are unwilling that the first volume of the new edition should pass from their hands without a distinct expression of their obligations to their staff of revisers, to their corps of regular contributors, and to the numerous men of eminence in science, literature, and official position, whose effective coöperation has lightened their own labors, and laid the foundation for the utility and value of the publication.

The volume now presented to the public may be regarded as an earnest of the literary and typographical execution of the whole work. It will be completed mainly by the same writers whose contributions are contained in the first edition, together with many others of equal ability (whose names will be hereafter announced), and will be made to pass through the press as rapidly as is consistent with mechanical accuracy.

NEW YORK, *July* 4, 1873.

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1883.

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A, THE first of the vowels, and the first letter of all written alphabets except the Amharic or Abyssinian, of which it is the thirteenth, and the Runic, of which it is the tenth. This almost universal precedence appears to be due to the fact that its typical and probably only original sound (*ah*) is the most easily uttered of all sounds, being produced by a simple expulsion of the breath through the freely opened throat and mouth. In English, A has at least four distinct sounds, as heard in *mate, mat, mart, ball;* and that heard in *mare* is usually reckoned a fifth. In the words *any, many,* it has exceptionally the sound of short *e.* In combination with other vowels, it is sometimes heard alone, as in *maid, aunt, pear;* and is sometimes silent, as in *boat, head, beauty.* The historical features of A are interesting. Its sound (probably that which we now have in *mart*) was disliked by Cicero, and in the treatise *De Oratore*, c. xlix., he terms it *insuavissima littera.* By the ancients, A was employed as a numeral, and stood for 500, and when a dash was placed over it, thus, Ā, for ten times that number, or 5,000. It is the first of the seven Dominical letters in the Julian calendar—an imitation of the *litteræ nundinales,* which were in use among the Romans long before the introduction of Christianity. In logic, the letter A denotes a universal affirmative. In the *comitia* of the Romans, it was used in giving suffrages. In criminal trials it represented *Absolvo*, I acquit; hence Cicero, in his speech for Milo, terms it *littera salutaris.* In ancient inscriptions, A stands for *Augustus, Augustalis, ager, agit, aiunt, aliquando, antique, assolet, aut;* AA for *Augusti, Augustæ, Aulus Agerius, æs alienum, ante audita, apud agrum, aurum argentum;* AAA for *Augusti* when three in number, and for *aurum, argentum, æs.* On the reverse of ancient medals, it indicates the city in which they were issued, as Argos or Athens; on modern coins it is the mark of the city of Paris, doubtless taken anagrammatically from the last letter of the name *Lutetia.* A is also a frequent abbreviation, as in A. D. for *Anno Domini*, A. M. for *Artium Magister* or *Anno Mundi*, &c. In medical prescriptions it is used thus, *ā*, or *āā*, for *ana*, of each. In bills of exchange it is in England and France an abbreviation for *accepted. AAA* is the chemical abbreviation for *amalgama.*—A, in music, is the nominal of the sixth diatonic interval of the first octave of the modern scale. It corresponds to the *La* of Guido. A was the lowest note of the ancient Greek scale, and for many centuries represented the deepest tone used in music. Alterations in the scale were made, however, in the 10th century by Guido, and subsequently by others, so that at present C is the first note of the natural scale, and A the sixth diatonic interval; *a* marks the same interval in the second octave. A is also the nominal of one of the two natural modes.

AA, the name of a number of small rivers in central and northern Europe, derived from the Celtic *ach*, or Teutonic *aa*, flowing water. The most important are: **I.** A river of the Netherlands, province of North Brabant, which joins the Dommel at Bois-le-Duc. **II.** A river of Russia, government of Livonia, flowing into the gulf of Riga. **III.** A river of France, department of Le Nord, flowing into the North sea near Gravelines. **IV.** A river of Switzerland, canton of Aargau, which forms the lakes of Baldegg and Hallwyl, and flows into the Aar. **V.** A river of Switzerland, canton of Unterwalden, which flows through the lake of Sarnen, and empties into the lake of Lucerne.

AACHEN. See AIX-LA-CHAPELLE.

AALBORG (Eel Town), a seaport and city of Denmark, in Jutland, capital of a district of the same name, on the S. shore of the Lymfiord, 15 m. from its outlet in the Cattegat; pop. in 1870, 11,721. It has a school of navigation, manufactories, and a large herring fishery. It was a celebrated seaport as early as 1070, and for a long time the most important mart of Jutland for all native products.

AALEN, a town of Würtemberg, capital of a bailiwick in the circle of Jaxt, on the Kocher, 45 m. E. N. E. of Stuttgart; pop. in 1871, 5,552. It has woollen factories, tanneries, and several iron works.

AALI PASHA, a Turkish statesman, born in Constantinople in 1815, died there, Sept. 7, 1871. The son of a priest and a functionary, he entered the public service at an early age as a protégé of Reshid Pasha. From 1834 to 1836 he officiated as secretary of legation in Vienna, and previous to his return to Turkey visited Russia. In 1838 he was attached to the legation at London, and subsequently became chargé d'affaires. He was under-secretary of foreign affairs in 1840, and ambassador to England from 1841 to 1844. After his return from England he was a member of the supreme council of state and of justice, foreign minister, and chancellor of the imperial divan. Under the administration of Reshid Pasha he continued to be minister of foreign affairs from 1846 to 1852. His ability in settling the controversy with Greece caused his promotion to the rank of mushir (field marshal) and pasha. Toward the end of 1852 he was for a short time grand vizier or prime minister; but disagreeing with his associates in the cabinet on important questions, and being held in a measure responsible for the failure of the first Turkish loan, he retired, and was appointed governor general of Smyrna (1853), and afterward of Brusa (1854). Toward the end of 1854, however, during the Crimean war, he was restored to power as president of the newly established board of reforms (*Tanzimat*), and as minister of foreign affairs. In 1855 he attended the conference of Vienna, and while absent was appointed grand vizier. He took a leading part in the convention which framed the Hatti-Humayun of Feb. 18, 1856, confirming all the guarantees previously given to the Christian powers for the equal rights and religious liberty of Christians in Turkey. As minister plenipotentiary he signed in 1856 the treaty of Paris, though he did not fully approve of its terms. Indeed, he found so many difficulties in regard to the arrangements of that treaty for the settlement of the Roumanian question that he relinquished his post of grand vizier to Reshid Pasha, Nov. 1, 1856, but the sultan induced him to remain a member of the cabinet without portfolio, and an active member of the supreme council. On Reshid Pasha's death he resumed the office of grand vizier, Jan. 11, 1858, but retired again in 1859, on account of dissatisfaction with the demands of the foreign powers and the reformatory measures of Abdul-Medjid. But he subsequently returned to his old post in the Tanzimat, and acted as grand vizier during the temporary absence of Rushdi Pasha, and as minister of foreign affairs during Fuad Pasha's visit to Syria, on occasion of the massacres of Damascus. After the accession of the present sultan, Aali Pasha was once more called to the head of the cabinet as grand vizier, June 7, 1861, but in November yielded that post to Fuad Pasha, becoming again minister of foreign affairs. In 1864 he attended the conference at Paris to settle the Roumanian question, and continued to preside over foreign relations till 1867, when he once more exchanged offices with Fuad. In June, 1867, the sultan appointed him regent of the empire during his visit to European courts. In September he went to Crete to finish the insurrection in that island, which however continued till 1868; but it was due chiefly to his moderation that a war with Greece was then avoided. After the death of Fuad Pasha (Feb. 11, 1869) Aali discharged the duties both of minister of foreign affairs and grand vizier. In the recent complications with Egypt, as well as in the precarious relations with Roumania, Albania, Bulgaria, Servia, and Montenegro, he displayed his characteristic moderation, and prevented an outbreak, while preserving the integrity of the Ottoman empire. In the London conference of 1870 for the consideration of the Russian demand for the deneutralization of the Black sea, and the modification to that effect of the treaty of Paris of 1856, he bore a conspicuous part, insuring the safety of Turkey. Before he died he had restored good relations with Russia and Greece, and checked the ambition of the khedive. His interest in reforms made him unpopular with the Turks of the old school, though with all his appreciation of Christian civilization he never ceased to be a zealous Moslem. He was small in stature, unseemly in appearance, diffident in manner, and distinguished for official honesty. His biographer, Fatin Effendi, ascribes to him poetical talent.

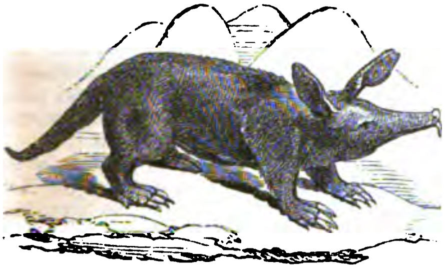
AALST. See Aelst.

AALTEN, a town of the Netherlands, province of Gelderland, district of Zutphen, situated on the Aa; pop. in 1867, 6,160, and increasing rapidly. It has many tanneries and factories.

AAR, or **Aare**, the largest river of Switzerland after the Rhine and the Rhône. It rises in the glaciers of the Grimsel in the Bernese mountains, forms at Handeck a magnificent waterfall above 290 feet high, flows N. W., N. E., and N. about 120 miles through the lakes of Brienz and Thun, and through the cantons of Bern, Soleure, and Aargau, and falls into the Rhine between the village of Coblenz, in Aargau, and Waldshut, in Baden. Its chief affluents are the Saane, Thiele, Emmen, Wigger, Reuss, and Limmat.—Aar is also the name of several small rivers in Germany.

AARAU, a town of Switzerland, capital of the canton of Aargau, on the Aar; pop. in 1870, 5,449. The town is well built, and is celebrated for its manufactories of mathematical instruments. In August, 1712, a peace was concluded at Aarau between the cantons of Bern and Unterwalden. During the time of the Helvetic republic (1798) Aarau was the seat of the central government.

AARD-VARK (*orycteropus capensis*), a plantigrade animal of the class *mammalia*, order *edentata*, peculiar to Africa, and extremely common in the southern part of that continent, especially in the Cape Colony, where it is called *aard-vark* or earth pig. It was formerly classed with the *myrmecophaga*, or ant-eaters. The aard-vark is more closely allied in anatomical structure and in its dental system to the armadillos than to any other class of animals, although it has not their defensive armor. It has neither incisors nor canine teeth, and its molars are different in structure from those of any other quadruped; they have no roots, and, like the tusks of the elephant and the incisors of the gnawing animals, are constantly increased by the deposit of new bony matter at the base to compensate for the continual wear at the extremity. It has large, flat feet, hollow on the under side, with powerful claws, the toes, four in front and five behind, gradually diminishing outward from the interior and second, corresponding to the fore and index fingers of the human hand. This structure gives it great facilities for digging the burrows in which it lives, and for excavating the hills of the great ants, on which it feeds exclusively, as do the *pangolins* of Asia, the *myrmecophaga* of America, and the *echidna* of Australia. At first sight, the aard-vark resembles a small, short-legged pig. Its length, when full-grown, exclusive of the tail, is about 3 feet 5 inches, its head 11 inches, its ears 6 inches, and its tail 1 foot 9 inches. Its head is long and attenuated, its upper jaw projecting beyond the lower; its mouth small; its tongue long, slender, and flat, unlike the cylindrical organ of the *myrmecophaga*, nor capable of so great protrusion, but, like theirs, covered with glutinous saliva, which firmly retains the ants with which it comes in contact. Its ears are long, erect, and pointed; its eyes of moderate size, two thirds nearer to the brow than to the snout. Its body is thick and corpulent, the limbs short and very strong. The skin is generally bare, but thinly scattered with a few stiff, reddish-brown hairs, which are more numerous on the hips and thighs than on the other parts of the body. The tail is nearly naked, very thick at the base, but tapering to a sharp point at the end. The aard-vark is a very timid, inoffensive animal, burrowing in the ground, if pursued, so rapidly as to get wholly out of sight in the space of a few minutes, and working inward with such power and quickness that it is impracticable to dig him out. It is nocturnal in its habits and in its hours of feeding, and becomes exceedingly fat. Its flesh is wholesome, and its hams, salted and dried, are good eating.



AARD-WOLF (earth wolf; *proteles Lalandii*, *viverra cristata*), a singular quadruped, of the digitigrade carnivorous mammalia, first brought from Caffraria by the traveller Delalande. To the external appearance and osteological structure of the hyena it unites the head and feet of the fox, and the intestines of the civet. It has five toes on the fore feet, the interior one of which is situated high above the others, and does not touch the ground, and but four behind. Its fore legs are much longer than the hind ones, which makes it comparatively slow in its motions. In size it is about equal to a full-grown fox, which it also resembles in its pointed muzzle; but it stands much higher on its legs, while its ears are larger and more naked, and its tail shorter and not so bushy. It has a coarse, stiff mane, which runs along the whole of its neck and back, and is erectile when the animal is enraged. Its general color is pale ash, with a slight tinge of yellowish brown; the muzzle is black, and nearly naked, with the exception of a few stiff moustaches. Around its eyes, and on each side of the neck, are dark brown transverse marks, and on the body are eight or ten similar bands, the arms and thighs being barred with the same color. Its legs and feet are dark brown behind, and gray on the inner surface. The long hairs of the mane are gray, with two bands of black, the latter occupying the tips; those of the tail, which are equally stiff, are of the same color. The ears are brown without, and gray internally. In habits it resembles the fox, constructing burrows, in which it sleeps during the day, going abroad and feeding only by night. It is timid, inoffensive, and shy in its habits, but many individuals are ordinarily found residents of the same burrow, which has always several apertures for escape. It is said to run very fast, in spite of the excessive length of its fore legs.

AARGAU (Fr. *Argovie*), a Swiss canton, bounded by Zürich, Zug, Lucerne, Bern, Soleure, Basel, and the Rhine, which separates it from Baden; area, 542 sq. m.; pop. in 1870, 198,873.

of whom 107,703 were Protestants, 89,180 Roman Catholics, and 1,542 Jews. The country is diversified by hills, mountains, and valleys, the soil well cultivated, and extensive vineyards abound. It is watered by the rivers Aar, Reuss, and Limmat, the two latter being navigable. Cottons, silks, and linens, woven by hand, are the principal manufactures, and, with straw hats, cheese, corn, wine, and cattle, form the chief exports. The canton is divided into the following eleven districts: Aarau (pop. 19,247), Baden (23,462), Bremgarten (18,751), Brugg (17,162), Kulm (20,790), Laufenburg (14,407), Lensburg (18,497), Muri (14,297), Rheinfelden (11,417), Zofingen (26,986), and Zurzach (13,861). Capital, Aarau. The canton was organized in 1803. Each of the 50 electoral districts elects a member of the grand council for every 260 voters and for a fraction of over 130; state officers and teachers of state schools are ineligible. The grand council elects from its number a governing council (*Regierungsrath*) of eleven members, three of whom at least must be Protestants and three Catholics.—On Feb. 13, 1841, all the convents of the canton were abolished and their property confiscated. The protest of several Catholic cantons against this measure was so vigorously supported by the Austrian government, that the government of the canton in 1843 reëstablished four female convents. Most of the cantons were satisfied with this, but the minority were induced by it to organize the Sonderbund. In 1862 the grand council declared in favor of the emancipation of the Jews, but the people voted it down.

AARHUUS, a seaport of Denmark, in East Jutland, capital of Aarhuus bailiwick, on the Cattegat, 37 m. S. E. of Viborg; pop. in 1870, 15,025. It contains one of the finest and largest cathedrals in Denmark, a library, and a museum. Its commerce is considerable, and it has a regular steam communication with Copenhagen.

AARON. I. Son of Amram, of the tribe of Levi, elder brother of Moses, his spokesman in the embassy to the court of Pharaoh, and subsequently the first high priest. He was recreant to his trust in the absence of Moses upon Mount Sinai, and made the golden calf for the people to worship. He died on Mount Hor at the age of 123 years, and his office descended to Eleazar, his son. **II.** A physician of Alexandria, Egypt, who flourished in the 7th century. He wrote on medicines, and is the first author who mentions the small-pox.

AARSENS, Frans van, a Dutch diplomatist, born at the Hague in 1572, died in 1641. In 1599 he was appointed ambassador at the French court, and concluded (1609) the truce of 12 years between the United Provinces and Spain. He was afterward ambassador to Venice, and sent on numerous special missions, and in 1640 went to England to negotiate the marriage between William prince of Orange and the princess Mary. He was originally a protégé and partisan of Barneveldt, but turned against him and was the chief instrument in his destruction.

AASEN, Ivar Andreas, a Norwegian philologist, born at Oersten, Aug. 5, 1813. The son of a poor farmer, he became well educated through his own efforts. He first devoted himself to botany, and then studied the different local dialects of his country, producing *Det norske Folkesprogs Grammatik* (Christiania, 1848) and *Ordbog over det norske Folkesprog* (1850). Among his more recent works is one on Norwegian proverbs (1856). An annuity has been conferred upon him by Norway.

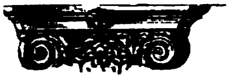
AASVÄR, a group of small islands, below the arctic polar circle, about 12 m. from the Norwegian coast, forming part of the prefecture of Nordre Helgoland and of the parish of Donnaes, in the province of Nordland. They have recently acquired importance as a station for herring fisheries, giving employment to over 10,000 fishermen. The annual value of the exports is estimated at about $1,000,000, and the fish is known as the great Nordland herring. They are caught from December to January, and sometimes in quantities exceeding 200,000 tons. During the rest of the year the islands are almost deserted.

AB, the eleventh month of the Jewish civil year and the fifth of the ecclesiastical, corresponding to a part of July and a part of August. The ninth of the month is one of the principal Jewish fast days, commemorating both the destruction of the temple of Jerusalem by Nebuchadnezzar and that by Titus.

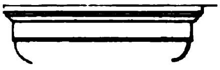
ABABDEH, or **Ababdie**, tribes of N. E. Africa, tributary to Egypt, under the jurisdiction of a resident sheik, spread over the N. part of the desert between the Nile and the Red Sea, from Kenneh to Asswan and Dera, and, according to Belzoni, as far as Suez. They are divided into three principal tribes—the Fokara, Ashabat, and Melaykab—and number about 120,000. Their armed force consists of about 20,000 men. They are often erroneously confounded with the Bedouin Arabs, but differ from them in appearance, habits, and language. Some of them are agriculturists, but they lead generally a nomadic life, and act as guides to the Sennaar caravans, which start from Daraweh, 40 m. N. of Asswan. They have few horses, but many camels and dromedaries, the latter being especially celebrated in the East. They fight mounted on camels, naked to the waist. Burckhardt, in his "Travels in Nubia," regards them as of Arab stock, but is not supported in this view by other authorities. However, they have intermarried with Arabs, and adopted their religion. To the Romans they are believed to have been known under the name of Blemyes; but after the Arab conquest of Egypt they appear under the collective name of Bega, as traders on the Red sea. Nearly on a line with Asswan, in the Ababdeh territory, are the ruins of Berenice.

ABACO, Great, a long and crooked island, the largest of the Bahama group, 150 m. E. of Florida, 80 m. long by an average of 15 wide. Its N. point is in lat. 26° 30′ N., lon. 76° 57′ W. Pop. about 2,000, including Little Abaco, adjoining, 28 by 4 to 5 m. Many of the inhabitants are white creoles. They work at shipbuilding, turtling, and wrecking.

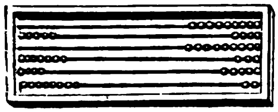
ABACUS. I. In architecture, the upper part of the capital of a column, supporting the entablature, said to have been designed from a square tile laid over a basket. The shape of the abacus differs in different orders. II. Among the ancients, a cupboard. III. The mystic staff carried by the grand master of the Templars. Its head was of silver, marked with the peculiar cross of the order; but it was supposed to bear another secret device, concealed or disguised, and revealed only to the initiated, being no other than the orthophallic symbol of heathen antiquity, indicating the worship of the generative power as distinct from the creative attribute of God. IV. A calculating machine to facilitate arithmetical computations. In China it is much employed. The Chinese call it shwanpan. A man who uses the shwanpan can tell the amount of a column of figures the moment they are read off to him. It is also found in Russian shops and counting houses. Improved forms of this machine are known in the United States as the "adder."



Corinthian Abacus.



Doric Abacus.



Counting Abacus.

ABAD I. (ABU AMRU IBN HABED), first Moorish king of Seville, and founder of the Abadite dynasty, born in the latter half of the 10th century, died about 1041. His ancestors, from Emesa in Syria, had settled at Tocina, on the Guadalquivir. He was brought up at Seville, where by his munificence and amiability he became so popular that the people, wearied by the bad administration of the Ommiyade rulers, chose him in 1028 as their king. After consolidating his power at Seville, he added Cordova to his dominions, and reigned 13 years.—**Abad II.** (MOHAMMED IBN HABED), son of the preceding, born in 1012, died in 1069. He added the territory of Carmona to Seville, gradually acquired all Andalusia, and aimed at the subjugation of entire Spain. He was cruel and relentless.—**Abad III.** (MOHAMMED IBN HABED), son of the preceding, born in 1039, died in 1095. He was celebrated for love of art and letters and for poetical talent. He continued the conquests of his father and grandfather, added a part of Portugal to his dominions, and threatened Castile. At the same time he was tolerant and kindly. Alfonso VI. of Castile, after having been his enemy, married his daughter. This alliance with a Christian king excited the jealousy of the petty Moorish rulers. Aided by the king of Morocco, they attacked Alfonso and Abad, and the latter only avoided the sacking of Seville by surrendering (1091). He was imprisoned four years in Morocco, where his four daughters were compelled to spin wool for their subsistence. His poems, composed during his captivity, were admired. The Abadite dynasty ended with him.

ABADDON. See APOLLYON.

ABAKA KHAN, second Mongol king of Persia, of the family of Genghis Khan, succeeded his father, Hulaku Khan, in 1265, and died about 1280. He completed the conquests of his father, restored Bagdad, and consolidated the Mongol sway over western Asia.

ABANA, mentioned in Scripture in connection with Pharpar as a river of Damascus, is now generally identified with the Barada, the Chrysorrhoas of the Greeks, while the Awaj is considered identical with Pharpar.

ABANCOURT, Charles Xavier Joseph d', minister of Louis XVI. of France, born at Douay, July 4, 1758, died Sept. 10, 1792. At the commencement of the revolution he was captain in the cavalry, but was made minister of war in consequence of the occurrences of June 20, 1792. During the proceedings of the 10th of August he was accused of being a foe to freedom, and was imprisoned. With many others he was dragged before the tribunal at Orleans, whence he was to be reconducted to Paris; but the transport was mobbed on the way at Versailles, and Abancourt and his fellow prisoners were butchered.

ABANO, Pietro d' (Lat. *Petrus de Apono*), an Italian philosopher, born at Abano in 1250, died in 1316. He studied at Constantinople and Paris, became professor of medicine at Padua, and wrote several works on philosophy and medicine. Like other men of his age, he practised astrology, and was accused of magic and sentenced to be burnt, but died in prison.

ABARBANEL. See ABRAVANEL.

ABARCA, Joaquin, a Spanish bishop, born in Aragon about 1780, died at Lanza, near Turin, June 21, 1844. Having been promoted in 1828 from a village priest to be bishop of Leon, for supporting the absolute rule of Ferdinand VII., he accompanied the pretender Don Carlos to Portugal and England, and acted as his agent, and in 1836 as his prime minister in the Basque provinces, but finally forfeited his regard. Being banished from Spain after various political intrigues and adventures, he retired in 1839 to a monastery at Lanza, where he remained until his death.

ABARIM, a mountain or range of highlands in eastern Palestine, facing Jericho. Its most elevated spot was Nebo, on which Moses died.

ABASCAL, José Fernando, a Spanish statesman, born at Oviedo in 1743, died in Madrid, June 30, 1821. He entered the Spanish army in 1762, and distinguished himself as colonel in the war against the French republic. In 1796 he became governor of Cuba, and defended Havana against the British. Thence transferred to be governor of New Galicia, he was in 1804 appointed viceroy of Peru. On his journey thither he was captured by the English, but escaped and reached Lima. His administration was successful, and for some time he checked the movement for independence in Peru, the Plata states, and Chili. On returning home, in 1816, he was greeted as a national benefactor and made a marquis.

ABAUZIT, Firmin, a French theologian and antiquary, born at Uzès, Nov. 11, 1679, died in Geneva, March 20, 1767. The revocation of the edict of Nantes banished his mother to Geneva while he was yet a boy, and her devotion to the reformed church incited the young Firmin to study theology and the exact sciences. At the age of 19, while travelling in Holland, he won the friendship of Bayle and Basnage. In England he became the friend of Newton, and was distinguished by William III. Voltaire and Rousseau spoke highly of his genius and wisdom. His writings include "An Essay on the Apocalypse," "Reflections on the Eucharist," and "The Mysteries of Religion."

ABBADIE. I. Jacques, a French Protestant divine, born at Nay, in Béarn, in 1658, died in London, Oct. 6, 1727. After completing his studies at Sedan he went to Germany and Holland, and became pastor of the French church of Berlin. In 1690 he went to England, and, after preaching some time in London, was made dean of Killaloe in Ireland. He was a warm partisan of William III., and wrote a defence of the revolution and a history of the assassination plot. His most important works are: *Traité de la divinité de Jésus Christ*, and *Traité de la vérité de la religion chrétienne*. **II. Antoine Thomson and Arnaud Michel d',** French explorers, brothers, born in Dublin, Ireland, in 1810 and 1815. Their father, a Frenchman temporarily residing in Dublin, returned with them to France in their early childhood. In 1835 Antoine explored Brazil on a mission from the academy of sciences, while Arnaud travelled in Algeria. The two brothers happening to meet at Alexandria in 1837, they set out on an exploring expedition to Abyssinia, which lasted till 1845, and afterward passed three years in the Galla country. A rumor of their death caused a third brother, Charles, to proceed to that country, where he found them; and in 1848 they returned to France. A joint work of the two brothers appeared in 1860–'68, under the title of *Géodésie d'Éthiopie*. Many of their writings are contained in the *Bulletin* of the Paris geographical society, including *Notes sur le haut fleuve Blanc*, published separately in 1849. The English expedition to Abyssinia led Arnaud d'Abbadie to publish in 1868 *Douze ans dans la Haute-Éthiopie*. The two brothers reside, when in France, at Urrugne, a village in the Basses-Pyrénées.

ABBAS I., the Great, fifth shah of Persia of the dynasty of the Sofis, born in 1557, died Jan. 27, 1628. He succeeded to the throne on the murder of his two elder brothers in 1587. He conquered Gilan, Mazanderan, Khorassan, and a great part of Afghanistan; and by the victory of Bassorah in 1605 over the Turks, and in many successive campaigns, he gained extensive accessions of territory all along the western frontier. Shah Abbas constructed the great highroad of Mazanderan, 300 miles long and 40 feet wide, of which parts still remain. He suppressed the Kurghis, a body similar to the Turkish janizaries; he fomented the sectarian differences of the Shiahs and the Sunnis, and reduced the dogmas of the Shiahs into the form of a creed. His fame extended to Europe, and ambassadors were sent to him from every court. He was not exempt from the vices of oriental despotism. Among other crimes, he put to death his eldest son, leaving his throne to his grandson, Sefy Mirza.

ABBAS BEN ABD-EL-MOTTALIB, paternal uncle of Mohammed, born at Mecca in 566, died in 652. He was the progenitor of the Abbasside dynasty, but not known as such until an adventurer, requiring a title to his usurpations, traced his descent to him. He was only four years the senior of Mohammed, and was yet a pagan when the prophet commenced his religious career, and long hesitated to espouse his nephew's cause. In the battle at the well of Bedr Abbas fought against his nephew, and was taken prisoner. So soon, however, as Mohammed's career seemed prosperous, the uncle gave in his adhesion, and became one of the most zealous supporters of the new faith. His influence and mediation brought over the family of the Koreishites; for when Mohammed, at the head of a powerful force, was about laying siege to Mecca, Abbas went forward, and not only demonstrated to Abu Sofian the inutility of resistance, but induced him to come to Mohammed's camp and to have a personal interview, which ended in Abu Sofian's making the profession of faith on behalf of himself and his kinsmen. When Mecca surrendered to Mohammed, the holy well Zemzem was retained, in deference to Abbas, its keeper, though other pagan rites and superstitions were swept away. At the battle of Honeïn Abbas rallied the fugitives and recovered the fortune of the day. At Mohammed's funeral he was chief mourner. Caliph Omar, on occasion of a terrible drought, took his hand, and prayed to Allah by the virtues of Abbas to have pity on the perishing people. Caliph Othman also, when he met the patriarch, dismounted.

ABBAS MIRZA, a Persian prince and warrior, born in 1783, died in 1833. He was the second and favorite son of Feth Ali, shah of Persia. He was the declared enemy of Russia, and commanded the armies of his father in the wars with that power in 1811–'13 and 1826–'8, but his campaigns proved unsuccessful. In 1829 the populace of Teheran murdered the Russian embassy, and Abbas Mirza voluntarily went to St. Petersburg to give satisfaction, but was dismissed honorably. He was amiable and chivalrous. He was nominated by his father heir to the throne, excluding his elder brother; but the father survived both.

ABBAS PASHA, viceroy of Egypt, grandson of Mehemet Ali, and nephew of Ibrahim Pasha, born in 1813, died July 12, 1854. He took an active part in the Syrian wars of his grandfather, but without distinguishing himself. After the brief reign of Ibrahim Pasha, Mehemet Ali's eldest son, Abbas ascended the viceregal throne, as hereditary successor, in 1848. He undid in many respects the work of Mehemet Ali, dismissed his European officials, and manifested an arbitrary, capricious, and cruel disposition. He succeeded, however, in disarming his adversaries at Constantinople, who endeavored to cripple him and reduce Egypt to a more inferior condition. In the Crimean war he aided the sultan. His death was sudden, and probably violent.

ABBASSIDES, caliphs of Bagdad, the third Mohammedan dynasty, founded by Abul Abbas as-Saffeh (the Bloody), who claimed the caliphate as lineal descendant of Mohammed's uncle Abbas, whence the name. He was proclaimed by his adherents at Cufah in 749, and afterward defeated and put to death the last Ommiyade caliph, Merwan II., all but two of whose family were treacherously slaughtered. He died in 754, and his descendants to the number of 36 reigned till 1258, when the last, Mostasem, was expelled from the throne by Hulaku Khan. The line includes the illustrious names of Al-Mansour, Haroun al-Rashid, and Al-Mamoun; but from the 10th century they had sunk to the position of mere spiritual chiefs of Islam, all political power being wielded by the emir el-omra, or commander-in-chief. After their deposition at Bagdad, Ahmed, a member of the family, fled to Egypt, where he was recognized as caliph, and his descendants nominally reigned there, under the protection of the Mamelukes, till 1517, when Egypt was conquered by the Turks. Motawakkel, the last caliph, was carried to Constantinople, but allowed to return to Cairo, where he died in 1538.

ABBATUCCI. I. Jacques Pierre, a French general, born in Corsica in 1726, died in 1812. He was a rival and political opponent of Paoli, but submitted to his control in the war with the Genoese. After the French conquest, which he resisted at first, he accepted a commission in the royal army, and was subsequently appointed to protect Corsica against the attempts of Paoli and the English. After the capture of Toulon he resigned and returned to France, where he was made general of division. He remained there till 1796, when, the English leaving Corsica, he went home. **II. Charles**, son of the preceding, born in 1771, died Dec. 3, 1796. He served in the early part of the revolution as artillery officer on the Rhine, and in 1794 was Pichegru's adjutant. He was made general of brigade for bravery in 1796, and afterward general of division for defeating the corps of the prince of Condé. He died from a wound received in an engagement with the Austrians at Hüningen, where Moreau caused a monument to be erected to his memory. **III. Jacques Pierre Charles**, a diplomatist, nephew of the preceding, born in Corsica, Dec. 22, 1791, died Nov. 11, 1857. Under the restoration he was a law officer in Corsica. After the revolution of 1830 he was appointed presiding judge at Orleans, and from 1839 was its representative in the chamber of deputies. He was a leader of the opposition to Guizot's ministry, and afterward of the reform banquets. After 1848 he was conspicuous in the national assembly by his opposition to the social-democratic movement. He subsequently became a zealous supporter of Louis Napoleon, and after the *coup d'état* was appointed by him minister of justice and keeper of the seals, Jan. 22, 1852. His sons, CHARLES (born March 25, 1816), ANTOINE DOMINIQUE, and SÉVERIN, all figured under the second empire as active Bonapartists, the last chiefly as representative from Corsica.

ABBÉ, the French word for abbot. Before the revolution of 1789, any Frenchman who chose to devote himself to divinity, or even to finish a brief course of study in a theological seminary, became an abbé, waiting hopefully for the king to confer on him the benefice of an abbey—that is, a certain portion of the revenues of a monastery. In the mean time he engaged in any and every kind of literary labor, exerted an important influence upon society, and was to be met with everywhere—at the court of the monarch, the public tribunals, the salon of the fashionable lady, the opera, the playhouse, and the café. An abbé was to be found in almost every wealthy family, either as the friend of the house or the private tutor of the children. There were many good and noble abbés, who acquired distinction as theologians, poets, and savants; but as a class they subjected themselves to popular suspicion and literary satire; and with the revolution they disappeared, though the title is still sometimes used as a phrase of politeness.—ABBÉS COMMENDATAIRES was the title of the 225 abbots appointed by the king of France. Each received one third of the revenues of a monastery, but he could not interfere with the *prieur claustral*, who had exclusive control. The *abbayes des savants* were sinecures for scholars and untitled scions of aristocracy.

ABBE, Cleveland. See supplement.

ABBEOKUTA, or **Abeakutah**, an independent city of central Africa, in the Egba district of Yoruba, with a small territory containing several minor towns, on the Ogoon, which separates it on the W. from Dahomey, about 50 m. N. of Lagos, and 110 m. E. S. E. of Abomey; pop. of the city estimated by Major Burton in 1861 at 150,000, and of the whole state at 200,000. The city stands on a granite formation 567 feet above the sea level, and is surrounded by a mud wall six feet high thatched with palm leaves, 20 m. in circumference and enclosing much farming land. The name is derived from a flat rock 600 feet long covering the top of a high hill and projecting at the sides. The streets are generally narrow and very irregular and dirty. The houses are built of dried mud and thatched, with 10 to 20 rooms, surrounding an inner court where sheep and goats are kept. Several trades are carried on in a primitive way, and there are unions of smiths, carpenters, weavers, dyers, and potters, the last two composed of women. Regular markets are held, with very active traffic, chiefly by women, in cooked and uncooked food, vegetable oils, shea or tree butter, raw cotton, grass and other cloths, manufactures of excellent leather, cutlery and other European manufactures, and many other articles. The currency is cowry shells, but in 1867 it was proposed to introduce copper coins. Caravans go from Abbeokuta to Lake Tchad and Timbuctoo, respectively 800 m. (direct) N. E. and 850 m. N. N. W. The town is at the head of navigation on the Ogoon, which is ascended by light steamers during eight months in the year. The principal exports are palm oil and shea butter. The native cotton plant is perennial and the fibre good, and great efforts have been made to stimulate its cultivation. In 1859–'60 the quantity sent to England was about 2,300,000 lbs., but it soon fell off to about 400,000 on account of local war and indolence.—The government of Abbeokuta is entirely elective. There is a king, whose functions are chiefly judicial. The army is commanded by an almost independent general (*balogun*), with elected war captains. There is a sort of legislature composed of the so-called Ogboni lodges (of which there is one in each town) and the war captains, which controls the revenue and taxation, and is said to possess unlimited power. The income of the state consists of taxes on products collected at the gates, amounting to about 1 per cent. The religion of most of the people is fetishism, but missions have been established by the Wesleyans, Episcopalians, and Baptists, whose converts in 1861 numbered about 1,500. They publish a newspaper in the Egba tongue, and there is a church built of wood with a mud steeple and a bell. The missionaries were temporarily expelled by a mob in 1867.—Abbeokuta was founded in 1825 by refugees from numerous Egba towns which had been destroyed in war and many of their inhabitants carried off as slaves. Its people opposed the slave trade, established commerce with the English at Badagry and Lagos, and have successfully withstood many attacks from neighboring states, especially Dahomey and Ibadan. The king of Dahomey suffered disastrous defeats under its walls in 1851 and 1864.

ABBESS, the female superior of a convent of nuns ranking as an abbey, in some of the more ancient orders. An abbess is solemnly blessed and inducted into office by a bishop, and uses the ring, cross, and crozier.

ABBEVILLE, a well built, fortified town of France, in the department of Somme, on the river Somme and the Northern railway, 25 m. N. N. W. of Amiens; pop. in 1866, 19,385. The town contains a fine but unfinished Gothic cathedral, with other public edifices, and among its manufactories is one of cloth founded by Colbert in 1669. Vessels of 300 tons burden sail up the Somme to Abbeville. In 1259 peace was here concluded between Louis IX. of France and Henry III. of England.

ABBEVILLE, a W. N. W. county of South Carolina, bounded S. W. by the Savannah river, and N. E. by the Saluda; area, 960 sq. m.; pop. in 1870, 31,129, of whom 20,213 were colored. The soil is generally fertile, well watered, and well cultivated. The Greenville and Columbia railroad runs through the county. The productions in 1868 were 4,044,713 lbs. of cotton, 324,850 bushels of corn, 52,686 of wheat, 51,374 of oats, and 23,471 of sweet potatoes. The total value of property in 1870 was $7,165,354. Capital, Abbeville.

ABBO CERNUUS, or **Abbon the Crooked**, a French monk of St. Germain des Prés, died in 923. He was the author of an epic poem of some historical value, in Latin, descriptive of the siege of Paris by the Northmen in 885–'7, at which he was present. A French translation of it has been published by Guizot.

ABBO FLORIACENSIS, or **Abbon of Fleury**, a French monk, abbot of Fleury, and author of "Lives of the Popes," born near Orleans about 945, slain Aug. 13, 1004, while striving to quell a fray. He was several times engaged in controversies with the bishops as champion of the rights of his order. In 986, and again in 996, Abbo was sent to Rome by King Robert, to persuade the pope to abandon his intention of placing the kingdom under interdict, and was successful in each case.

ABBOT (from the Semitic *ab* or *abba*, father), a prelate of high rank in the Roman Catholic church, who governs a principal monastery of one of the old religious orders, which may also have minor convents depending on it. An abbot is solemnly consecrated by a bishop, though this is regarded as a merely ecclesiastical and not a sacramental rite. Abbots are allowed to use the mitre, pastoral cross, ring, and crozier, and to celebrate pontifical mass, and are styled right reverend. Some of them in former times exercised a quasi-episcopal jurisdiction over a small district, and were allowed to confer tonsure and minor orders. During the middle ages many abbots, especially in England, were powerful feudal barons. In modern times they are simply superiors of religious houses. In ecclesiastical councils an abbot can speak, but not vote.

ABBOT, Abiel, D. D., an American clergyman, born in Andover, Mass., Aug. 17, 1770, died on the return voyage from Havana, June 7,

1828. He graduated at Harvard university, and in 1794 became minister of the Congregational society in Haverhill, where he remained eight years. In 1802 he took charge of a parish in Beverly, and passed the remainder of his life as pastor in that place. He was entirely free from sectarian bitterness. He was the author of a series of "Letters from Cuba" (8vo, Boston, 1829), and a number of sermons.

ABBOT, Benjamin, LL. D., an American teacher, for 50 years principal of Phillips academy at Exeter, N. H., born about 1763, died at Exeter, Oct. 25, 1849. He graduated at Harvard college, and took charge of the academy, which he conducted till 1838.

ABBOT, Charles, Lord Colchester, from 1802 till 1817 speaker of the British house of commons, born Oct. 14, 1757, died May 8, 1829. He served through a long and useful career in parliament, occupying at different times offices of honor and emolument. He was the author of one or two treatises on juridical reform. In 1817 he retired from the speakership, and was raised to the peerage as Baron Colchester.

ABBOT, George, archbishop of Canterbury, born at Guildford, Oct. 29, 1562, died at Croydon, Aug. 5, 1633. In 1597 he was appointed master of University college, Oxford, and was three times vice chancellor. In 1604, when by order of King James the translation of the Bible was commenced, Abbot was one of the eight divines to whom the whole of the New Testament except the Epistles was intrusted. In 1609 he was made bishop of Lichfield and Coventry; in January, 1610, bishop of London; in November following, archbishop of Canterbury. He steadfastly opposed King James's project of a divorce between Lady Frances Howard and the earl of Essex, and combated the royal decree permitting Sunday sports. Laud was his bitter enemy. While visiting Hampshire for the restoration of his health, he accidentally shot a gamekeeper with the arrow aimed at a deer; and this misfortune, which was made the subject of a judicial inquiry and a royal pardon, preyed on his health and spirits during the rest of his days.

ABBOT, Gorham Dummer, LL. D., an American teacher and author, brother of Jacob and J. S. C. Abbott, born in Brunswick, Me., Sept. 3, 1807, died at South Natick, Mass., Aug. 3, 1874. After studying theology at Andover he made the tour of the United States and several voyages to Europe, to examine the systems of public education and the extent and character of the issues of the press. In 1837 he became pastor of the Presbyterian church at New Rochelle, N. Y.; in 1841-'3 was travelling agent of the "American Society for the Diffusion of Useful Knowledge;" and in 1843 commenced the "Abbot Collegiate Institute" for young ladies in New York, afterward called the "Spingler Institute." He retired from teaching in 1866. He wrote "Pleasure and Profit," "Prayer Book for the Young," "Mexico and the United States, their Mutual Relations and Common Interests" (8vo, 1869), &c., and edited several educational and periodical works. (See ABBOTT.)

ABBOT, Samuel, a wealthy Boston merchant, one of the founders of the Andover theological seminary, born at Andover in 1732, died April 30, 1812. In 1807 he made a donation of $20,000 toward establishing the seminary, and at his death left it $100,000 in addition. He also gave away large sums for various charitable objects.

ABBOTSFORD, the seat of Sir Walter Scott, from which his baronet's title was taken. It

Abbotsford.

is situated in the parish of Melrose, in Roxburghshire and Selkirkshire, on the right bank of the Tweed, and in the neighborhood of the abbeys of Melrose, Jedburgh, and Dryburgh, and the towns of Selkirk and Galashiels. Sir Walter bought the estate in 1811, built the mansion, and gave it its present name, adopted from an adjoining ford in the Tweed. The house is irregular, and after the pattern of the old English manor houses; flourishing plantations hem it round, and a beautiful haugh or meadow on the opposite side of the Tweed forms its immediate prospect. The external walls of the house and garden are intercalated with antique carved stones taken from old castles and abbeys. The inside was decorated with beautiful paintings, the work of D. B. Hay of Edinburgh, and a library of curious works and British antiquities. Abbotsford was occupied by James Hope Scott, Esq., and his wife, the sole surviving granddaughter of Sir Walter Scott, until that lady's death, Oct. 26, 1858. Since that period, pending the minority of Miss Scott, the only surviving child, the mansion has been let for the use of a Roman Catholic seminary for girls.

ABBOTS-LANGLEY, a parish in Hertfordshire, England, 21 m. N. of London, noted as the birthplace of Nicholas Breakspear (Pope Adrian IV.), the only Englishman who ever occupied the holy see. "The Booksellers' Retreat" in this place is an institution founded by English booksellers as a home for decayed members of the trade.

ABBOTT, a family of American writers, whose name was originally spelled Abbot. **I. Jacob,** born at Hallowell, Me., Nov. 14, 1803. He graduated at Bowdoin college, Brunswick, Me., in 1820, and studied divinity at the theological seminary in Andover, Mass. From 1825 to 1829 he was professor of mathematics and natural philosophy in Amherst college, and afterward took charge of the newly founded Mount Vernon school for girls in Boston. In 1834 he engaged in organizing a new Congregational church in Roxbury (the Eliot church); and about 1838, relinquishing the pastoral charge to his brother John S. C., he removed to Farmington, Me., and has since devoted himself almost exclusively to literary labor, chiefly in the production of books for the young. For several years he has resided in New York. A complete catalogue of his works would considerably exceed 200 titles. Many of them have been serial, each series comprising from 3 to 36 volumes. Among them are the "Young Christian" series (4 vols.), the "Rollo Books" (28 vols.), the "Lucy Books" (6 vols.), the "Jonas Books" (6 vols.), the "Franconia Stories" (10 vols.), the "Harper's Story Books" (36 vols.), the "Marco Paul Series" (6 vols.), the "Gay Family" series (12 vols.), the "Juno Books" (6 vols.), "Rainbow and Lucky" series (5 vols.), and 4 or 5 other series of 5 or 6 volumes each; "Science for the Young" (4 vols. issued, "Heat," "Light," "Water and Land," and "Force"); "A Summer in Scotland"; "The Teacher"; more than 20 of the series of illustrated histories to which his brother John S. C. contributed, and a separate series of histories of America in 4 volumes. He has also edited, with additions, several historical text books, and compiled a series of school readers. **II. John Stephens Cabot,** brother of the preceding, born in Brunswick, Me., Sept. 18, 1805, died in Fair Haven, Conn., June 17, 1877. He graduated at Bowdoin college in 1825, and studied theology at Andover. He was ordained to the ministry in the Congregational church in 1830, and was settled successively at Worcester, Roxbury, and Nantucket, Mass. His first published work, "The Mother at Home," appeared in 1833, and was followed not long after by "The Child at Home." In 1844 he relinquished the pastorate, and devoted himself exclusively to literature, but afterward occasionally resumed his ministerial labors for brief periods, and in 1866–'8 acted as stated supply in New Haven. With few exceptions his works are professedly historical. The principal of them are: "Practical Christianity"; "Kings and Queens, or Life in the Palace"; "The French Revolution of 1789"; "The History of Napoleon Bonaparte" (2 vols.); "Napoleon at St. Helena"; "The History of Napoleon III." (1868); 10 vols. of illustrated histories; "A History of the Civil War in America" (2 vols., 1863–'6); "Romance of Spanish History" (1870); and "The History of Frederick the Second, called Frederick the Great" (1871). Most of Mr. Abbott's books have had a large sale, and several of them have been translated into many languages. **III. Gorham D.** See ABBOT. **IV. Benjamin Vaughan,** son of Jacob, a lawyer, born in Boston, June 4, 1830. He was educated in New York, and admitted to the bar in 1851. He has produced many volumes of reports and digests of state and United States laws and decisions of the higher courts of New York. He is now (1872) a member of the national commission for revising the laws of the United States, and is also preparing a National Digest. **V. Austin,** brother of the preceding, also a lawyer, born in Boston, Dec. 18, 1831. He was admitted to the New York bar about 1852, entered into partnership with his brother, and has coöperated with him in the preparation of legal treatises, compilations, and digests. He has also occasionally contributed to lighter literature, his earliest ventures being two joint novels entitled "Conecut Corners" and "Matthew Caraby," in which his brothers Benjamin and Lyman participated. **VI. Lyman,** brother of the preceding, born in Roxbury, Mass., Dec. 18, 1835. He graduated from the university of the city of New York in 1853, studied law, and went into partnership with his brothers in 1856; but he afterward studied theology with his uncle, the Rev. J. S. C. Abbott, and was ordained to the ministry in the Congregational church at Farmington, Me., in 1860. He was settled as pastor of the first Congregational church in Terre Haute, Ind., the same year, and remained there till 1865, when he was chosen secretary of the American union (freedmen's) commission, and held that office till 1868. He was also pastor of the New England church in New York city from 1866 to 1869, when he resigned, to devote himself to literature. He was associated with his brothers in the production of two novels, and has also published "The Results of Emancipation in the United States" (1867), "Jesus of Nazareth: His Life and Teachings" (1869), and "Old Testament Shadows of New Testament Truths" (1870). He has edited two volumes of "Sermons by Rev. Henry Ward Beecher," and "Morning and Evening Exercises," selected from the writings of the same author. He is now (1872) the editor of the "Literary Record" of "Harper's Monthly Magazine," and editor-in-chief of "The Illustrated Christian Weekly," published by the American tract society. **VII. Edward**, brother of the preceding, born in Farmington, Me., July 15, 1841. He was educated in New York, has contributed to periodical and other literature, and is one of the editors of "The Congregationalist," a leading Congregational newspaper published in Boston.

ABBOTT, Charles, Lord Tenterden, an English lawyer, born Oct. 7, 1762, died Nov. 4, 1832. He was appointed lord chief justice of the king's bench in 1818, and in 1827 was created a peer as Baron Tenterden. His treatise on maritime law is a standard work.

ABBREVIATIONS, certain contractions of various words and phrases, effected by omitting some of the letters or syllables. The object in view is the saving of time and space. They are found in every written language, but since the art of printing was discovered are much less used. The Romans called them *notæ*, and Lucius Annæus Seneca made a list of them, embracing upward of 5,000. The abbreviations in most ordinary use are those of names and titles. Physicians and lawyers use them largely for the sake of despatch. The Jewish writers not only throw out letters and syllables, but often omit everything except the initial letter. They even take the initials of a continuous series of words, and, uniting them with the aid of vowels, make new words standing in the place of all those thus abridged. The monks of the middle ages used so many abbreviations in copying the works of the Greek and Latin writers, that only experienced persons can decipher them. The Germans use them to a greater extent than any other nation, for words in common use. Many words in modern languages originated in Latin abbreviations, which illiterate persons mistook for the words themselves. The following are the principal abbreviations in common use:

A. B. Artium Baccalaureus, Bachelor of Arts.
Abp. Archbishop.
A. C. Ante Christum, before Christ.
Acct. Account.
A. D. Anno Domini, in the year of our Lord.
Adjt. Adjutant.
Ad lib. Ad libitum, at pleasure.
Adm. Admiral.
Admr. Administrator.
Admx. Administratrix.
Æt. or Ætat. Ætatis, of age.
A. G. Adjutant General.
A. H. Anno Hegiræ, in the year of the Hegira.
Ala. Alabama.
A. M. Anno mundi, in the year of the world; Ante meridiem, before noon; Artium Magister, Master of Arts.
A. R. A. Associate of the Royal Academy.
Ark. Arkansas.
A. U. C. Anno urbis conditæ, or Ab urbe condita, in the year from the building of the city (Rome).
B. A. Bachelor of Arts.
Bart. or Bt. Baronet.
Bbl. Barrel.
B. C. Before Christ.
B. D. Bachelor of Divinity.
B. I. British India.
B. L. Bachelor of Law.
Bp. Bishop.
Brig. Gen. Brigadier General.
Bush. Bushel.
B. V. Blessed Virgin.
B.V.M. Blessed Virgin Mary.
C. Centigrade (thermometer).
Cal. California.
Cap. Capitulum, chapter.
Capt. Captain.
C. B. Companion of the Bath; Cape Breton.
C. E. Civil Engineer.
Cent. Centum, hundred.
Cf. Conferre, compare.
Chap. Chapter.
Chron. Chronicles.
C. J. Chief Justice.
C. O. D. Collect (or cash) on delivery.
C. G. H. Cape of Good Hope.
Col. Colonel; Colossians; Colorado.
Conn. or Ct. Connecticut.
Cor. Corinthians.
Cor. Sec. Corresponding Secretary.
Coss. Consules, consuls.
C. R. Civis Romanus, a Roman citizen.
Cr. Creditor.
C. T. Colorado Territory.
Ct. or Conn. Connecticut.
Cwt. Hundred weight.
D. (*d.*). Denarius, denarii, a penny, pence.
D. C. District of Columbia.
D. C. L. Doctor of Civil Law.
D. D. Doctor of Divinity.
Del. Delaware; delineavit, drew it.
Deut. Deuteronomy.
D. F. Defensor fidei, defender of the faith.
D. G. Dei gratia, by the grace of God.
Do. Ditto (Ital., said), the same.
Dr. Doctor; debtor.
D. T. Dakota Territory.
D. V. Deo volente, God willing.
Dwt. Pennyweight.
E. East.
Eccl. or Eccles. Ecclesiastes.
Ecclus. Ecclesiasticus.
E. E. Errors excepted.
E. g., or Ex. gr. Exempli gratia, for example.
E. I. East India, or East Indies.
Eph. Ephesians.
Esd. Esdras.
Esq. Esquire.
Et al. Et alii, or alios, and others.
Etc. Etcetera, and so forth.
Et seq. Et sequentes, or sequentia, and the succeeding.
Ex. or Exod. Exodus.
Exr. Executor.
Ezek. Ezekiel.
F., or Fahr. Fahrenheit.
F. and A. M. Free and Accepted Masons.
F. A. S. Fellow of the Antiquarian Society.
F. D. Fidei defensor, defender of the faith.
F. G. S. Fellow of the Geological Society.
Fla. or Flor. Florida.
F. R. G. S. Fellow of the Royal Geographical Society.
F. R. A. S. Fellow of the Royal Astronomical Society.
F. R. S. Fellow of the Royal Society; L., of London; E., of Edinburgh; D., of Dublin.
F. S. A. Fellow of the Society of Antiquaries.
Ga. Georgia.
Gal. Galatians.
G. C. B. Grand Cross of the Bath.
Gen. General; Genesis.
G. M. Grand Master.
Gov. Governor.
Hab. Habakkuk.
Hag. Haggai.
H. B. M. His or Her Britannic Majesty.
Heb. Hebrews.
Hhd. Hogshead.
H. I. H. His or Her Imperial Highness.
H. M. S. His or Her Majesty's ship.
Hon. Honorable.
Hos. Hosea.
H. R. House of Representatives.
H. R. H. His or Her Royal Highness.
Ia. Iowa. (This should not be used for Indiana, but Ind.)
Ib. or Ibid. Ibidem, in the same place.
Id. Idem, the same.
Id. T. Idaho Territory.
I. e. Id est, that is.
I. H. S. Jesus Hominum Salvator, Jesus (Iesus) the Saviour of men. (Said to have originated from a misreading of the Greek ΙΗΣ for ʼΙΗΣΟΥΣ, Jesus.)
Ill. Illinois.
Incog. Incognito, unknown.
Ind. Indiana.
Ind. T. Indian Territory.
Inst. Instant, of the present month.
I. O. O. F. Independent Order of Odd Fellows.
I. O. U. I owe you.
Isa. Isaiah.
I. T. Idaho Territory; Indian Territory. (Better, Id. T. and Ind. T.)
Jam. Jamaica.
Jer. Jeremiah.
JJ. Justices.
Josh. Joshua.
J. P. Justice of the Peace.
J. U. D. Juris utriusque doctor, doctor of both canon and civil law.
Jud. Judith.
Judg. Judges.
Kan. Kansas.
K. B. Knight of the Bath.
K. C. B. Knight Commander of the Bath.
K. G. Knight of the Garter.

K. G. C.	Knight Grand Cross.
K. G. C. B.	Knight of the Grand Cross of the Bath.
Ks.	Kansas.
Kt.	Knight.
Ky.	Kentucky.
L. (*l.*, £).	Libra, a pound (money).
La.	Louisiana.
Lb.	Libra, a pound (weight).
L. C.	Lower Canada.
Lev.	Leviticus.
L. I.	Long Island.
Lib.	Liber, book.
Lieut. or Lt.	Lieutenant.
LL. B.	Legum Baccalaureus, Bachelor of Laws.
LL. D.	Legum Doctor, Doctor of Laws.
L. S.	Locus sigilli, place of the seal.
L. S. D.	Pounds, shillings, and pence.
M.	Monsieur.
M. A.	Master of Arts.
Macc.	Maccabees.
Maj. Gen.	Major General.
Mal.	Malachi.
Mass.	Massachusetts.
Matt.	Matthew.
M. C.	Member of Congress.
M. D.	Medicinæ Doctor, Doctor of Medicine.
Md.	Maryland.
M. E.	Methodist Episcopal.
Me.	Maine.
Messrs.	Messieurs, gentlemen, sirs.
Mic.	Micah.
Mich.	Michigan.
Minn.	Minnesota.
Miss.	Mississippi.
Mlle.	Mademoiselle.
MM.	Messieurs.
Mme.	Madame.
Mo.	Missouri.
Mons.	Monsieur.
M. P.	Member of Parliament.
MS., MSS.	Manuscript, manuscripts.
M. T.	Montana Territory.
Mt.	Mount.
Mus. D. or Mus. Doc.	Doctor of Music.
N.	North.
N. A.	National Academician; North America.
N. B.	Nota bene, mark well; New Brunswick; North Britain.
N. C.	North Carolina.
N. E.	Northeast; New England.
Neb.	Nebraska.
Neh.	Nehemiah.
Nem. con.	Nemine contradicente, no one contradicting, unanimously.
Nev.	Nevada.
N. F.	Newfoundland.
N. G.	New Granada.
N. H.	New Hampshire.
N. J.	New Jersey.
N. M.	New Mexico.
N. O.	New Orleans.
No.	Numero, number.
N. P.	New Providence.
N. S.	New style; Nova Scotia.
N. T.	New Testament.
Num.	Numbers.
N. W.	Northwest.
N. Y.	New York.
N. Z.	New Zealand.
O.	Ohio.
Ob.	Obiit, died.
Obad.	Obadiah.
Or.	Oregon.
O. S.	Old style.
O. T.	Old Testament.
Oxon	Oxoniensis, of Oxford.
Oz.	Ounce.
Pa.	Pennsylvania.
P. E.	Protestant Episcopal.
P. E. I.	Prince Edward Island.
Penn.	Pennsylvania.
Per cent. or per ct.	Per centum, by the hundred.
Ph. D.	Philosophiæ Doctor, Doctor of Philosophy.
Phil.	Philippians.
Phila.	Philadelphia.
P. M.	Postmaster; Post meridiem, after noon.
P. O.	Post office.
P. P.	Parish priest.
P. P. C.	Pour prendre congé, to take leave.
P. R.	Porto Rico.
Prof.	Professor.
Pro tem.	Pro tempore, for the time, temporarily.
Prov.	Proverbs.
Prox.	Proximo, next, of the next month.
P. S.	Postscript.
Ps.	Psalm.
Pxt.	Pinxit, painted it.
Q.	Quadrans, farthing.
Q. C.	Queen's counsel.
Q. d.	Quasi dicat, as if he should say.
Q. E. D.	Quod erat demonstrandum, which was to be demonstrated.
Q. M.	Quartermaster.
Qr.	Quarter; farthing.
Q. S.	Quantum sufficit, as much as is necessary.
Qu., Qy.	Quære, query.
Q. v.	Quod vide, which see.
R.	Rex or Regina, king or queen.
R. A.	Royal Academician; Royal Artillery.
R. E.	Royal Engineers.
Rec. Sec.	Recording Secretary.
Ref. Ch.	Reformed Church.
Rev.	Revelation; Reverend.
R. I.	Rhode Island.
R. M. S.	Royal mail steamer.
R. N.	Royal Navy.
Rom.	Romans.
R. S. D.	Royal Society of Dublin.
R. S. E.	Royal Society of Edinburgh.
R. S. V. P.	Répondez s'il vous plait, Answer if you please.
Rt. Hon.	Right Honorable.
Rt. Rev.	Right Reverend.
S. (*s.*).	Solidus, shilling; south.
S. A.	South America.
Sam.	Samuel.
S. C.	South Carolina.
Sc. or Sculp.	Sculpsit, engraved it.
Scan. Mag.	Scandalum magnatum, defamation of the great, or of officials.
Sec.	Secretary.
S. J.	Society of Jesus, Jesuit.
S. P. Q. R.	Senatus Populusque Romanus, the senate and people of Rome.
Ss.	Scilicet, namely.
St.	Saint.
S. T. D.	Sacræ Theologiæ Doctor, Doctor of Sacred Theology.
Tenn.	Tennessee.
Thess.	Thessalonians.
Tit.	Titus.
T. T. L.	To take leave.
U. C.	Upper Canada; Urbis conditæ, year of Rome.
Ult.	Ultimo, last, of the last month.
U. P.	United Presbyterian.
U. S.	United States; United Service.
U. S. A.	United States of America; United States Army.
U. S. N.	United States Navy.
U. T.	Utah Territory.
V. or vs.	Versus, against.
V. A.	Vicar Apostolic.
Va.	Virginia.
V. D. M.	Verbi Dei Minister, Minister of the Word of God.
Ven.	Venerable.
V. G.	Vicar General.
Viz.	Videlicet, namely.
V. P.	Vice President.
Vs.	Versus, against.
Vt.	Vermont.
W.	West.
W. I.	West Indies.
Wis.	Wisconsin.
W. S.	Writer to the Signet.
W. T.	Washington Territory.
W. Va.	West Virginia.
Wy. T.	Wyoming Territory.
X.	Χριστος, Christ.
Xmas.	Christmas.
Zech.	Zechariah.
Zeph.	Zephaniah.
&c.	Et cetera, and so forth.

ABD, an initial word in proper names common to the Semitic languages. It signifies "servant," and is usually coupled with the name of the Divinity or of a moral attribute; thus, Abd-allah, "the servant of Allah;" Abd-er-Rahman, "servant of the Merciful."

ABDALLAH BEN ABD-EL-MOTTALIB, an Arab merchant, father of Mohammed, born at Mecca about 545, died in 570. In youth, according to the Moslem legend, he narrowly escaped sacrifice at his father's hands, who, having but this one child, had made a vow to the gods that if they would grant him ten children, he would sacrifice one to them. The children came, and the lot, being taken, fell on Abdallah, then 24 years old. The father was on the point of fulfilling his vow, when by the advice of his friends he stayed his hand, and consulted a wise woman, who directed him to place ten camels, the price of blood among the Arabs, on one side, and his son on the other, and to cast lots between them; and as often as the lots should be against the youth, he was to add ten more camels. The experiment was tried, and the lot was against Abdallah ten times; the father sacrificed one hundred camels and saved his son. Immediately after this escape, Abdallah married Amina, daughter of Wahb, chief of the tribe of Benu Zahra. On the evacuation of Mecca by the Abyssinians, who had invaded the country, he was sent by his father to Medina, then called Yathreb, to buy provisions for the famished Meccaites, who had been obliged to fly to the mountain fastnesses. Abdallah died on the journey, leaving his wife pregnant with her first child. That child was Mohammed.

ABDALLAH BEN ZOBAÏR, ruler of Mecca, born about 622, died in 692. He was the first born of the disciples of Mohammed after the hegira, and his advent was a matter of great rejoicing. He was the son of Zobaïr, a friend and companion of Mohammed, and of Asma, the sister of Ayesha, the prophet's favorite wife. He was thus Mohammed's nephew by marriage, and was brought up under his immediate tutelage. After Mohammed's death, the question of succession was one of great moment. On the death of the prophet's immediate successors, and the election of Ali, Mohammed's nephew and son-in-law, to whom Ayesha was decidedly opposed, Abdallah sided with his aunt and resisted Ali's claims. He was, however, severely wounded in a contest with the rival faction; but on the assassination of Ali he boldly renewed his opposition to Moawiyah, and on his death raised the standard of revolt against Yezid, his successor. He seized upon the holy city, and maintained himself against both the remonstrances and the arms of the caliph. At this early period there were three distinct governments in the territories conquered by the Arabs, in Persia, Syria, and Arabia. Abdallah's chief opponent was Yezid, caliph of Damascus. In the siege which he sustained at Mecca, the temple of the holy Caaba was destroyed by the assailants, and the death of Yezid alone saved the city from capture. Abdallah was now acknowledged sultan and caliph of Mecca by the Arabs, and rebuilt the city and temple, not without opposition from his superstitious subjects, who considered it sacrilege to touch the stones of the sacred edifice. He completed the restoration in 685. Yezid's son, Moawiyah II., abdicated in favor of Merwan, on whose death his son Abd-el-Malek ben Merwan succeeded him, and pushed the war vigorously against Abdallah, by whose anathemas Abd-el-Malek's subjects, when they made the pilgrimage to Mecca, were greatly influenced or scandalized. Abd-el-Malek vanquished Abdallah's brother and lieutenant Mozab ben Zobaïr in the plains of Persia, added Irak to the caliphate of Damascus, and despatched an army against Abdallah at Mecca. The holy city was a second time besieged, and resisted for several months. Abdallah, at the age of 70, defended himself to the last, and when the city was taken by storm retired to the Caaba, where he was killed by a blow on the head from a tile. He is described as brave to rashness and crafty to perfidy.

ABD-EL-HALIM, known as HALIM PASHA, an Egyptian prince, son of Mehemet Ali and a white slave woman, born at Cairo in 1826. He was educated at Paris, and of late resides near Cairo, in a magnificent palace celebrated for its beautiful pleasure grounds. The sultan has often taken his part in his family quarrels with his relatives Abbas and Saïd, the late viceroys, and Ismail Pasha, the present khedive. Abbas (1848–'54) endeavored even to appropriate Halim's property, but restored it to him at the request of the sultan, who also conferred upon Halim the rank of pasha and mushir (field marshal). Under Saïd he was for a short time a member of the family council, until that viceroy was formally recognized by the sultan (July, 1854). In 1855–'6 he officiated for a brief period as governor general at Khartoom. Since the accession of his nephew Ismail (1863), Halim has been more persecuted than in the reign of Abbas Pasha. In 1866, when the sultan consented to modify the organic Mohammedan laws of succession in favor of a direct line of hereditary rulers in Egypt, it was hoped that this would do away with the jealousy of Ismail Pasha against his uncle, but the khedive remains unfriendly.

ABD-EL-HAMID, the Arabic name adopted by DU COURET, a French traveller, on his becoming a Mohammedan. He was born in 1812 at Hüningen, in Alsace, travelled from 1834 to 1847 in the East, was sent in 1848 on a mission to Timbuctoo, a report of which appeared in 1853 (*Mémoire à Napoléon III.*), and published in 1855 the story of his Arabic pilgrimages (*Médine et la Mekke*, 3 vols.), which was worked up by Alexandre Dumas in his *Pèlerinage de Hadji Abd-el-Hamid Bey* (2 vols., 1855).

ABD-EL-KADER, an Arab emir in Algeria, born near Mascara in 1806, died in Damascus in November, 1879. He was the descendant of an ancient family of marabouts, and the son of Mahiddin, an influential emir, who, suspected of plotting against Turkish rule, was compelled to retire with his son to Cairo in 1827. When Abd-el-Kader returned, Algiers had been captured by the French. A man of remarkable powers and accomplishments, and of the greatest bravery, the young emir soon became the leader of his countrymen, and organized among them a system of resistance to the French invaders, whom he began to harass at the head of his own and the neighboring tribes. Encouraged by the failure of an attack which Gen. Boyer, commandant of Oran, made in the spring of 1832 upon his stronghold at Tlemcen, Abd-el-Kader conducted his attacks upon the French on a larger scale, and with such skill and bravery that the admiring Arabs proclaimed him chief of the believers. For two years he continued operations, but in 1834 Gen. Desmichels, Boyer's successor, by causing a defection of the native tribes, obliged him to make peace, France acknowledging his sway over the tribes west of the Shelliff. Abd-el-Kader now spent a short period of quiet in introducing European discipline and tactics among his followers. But he soon crossed the Shelliff during a successful war with a native chief; and the French, alarmed by his growing power, again began hostilities under Gen. Trézel, who was sent to replace Desmichels. Trézel, marching toward Mascara, was surprised and utterly defeated by Abd-el-Kader in the defile of Muley Ismail. Marshal Clauzel was now made governor of Algiers. In December and January, 1835–'6, he succeeded in reaching and destroying Mascara, and in capturing Tlemcen, where he left a garrison; but this accomplished, he was obliged at once to make a disastrous retreat to Oran. In April, 1836, Abd-el-Kader utterly defeated Gen. d'Arlanges near Tlemcen, and obliged him to fall back on a fortified camp he had established on the Tafna to keep open the communication between the French garrison of Tlemcen and their base of supplies. In this camp the general was shut up by Abd-el-Kader's troops, and compelled to remain until relieved by Gen. Bugeaud. This officer was now appointed to the command in Algiers, and conducted the war with great success, first defeating Abd-el-Kader July 7, 1836, and finally compelling him in May, 1837, to conclude a peace by which he acknowledged French sovereignty, though himself confirmed as emir of Oran, Titteri, and part of Algiers. But he was not content, and in 1839 war was renewed. After desperate fighting, Abd-el-Kader was defeated everywhere; and in 1842 he was driven from Algeria and took refuge in Morocco, where he induced the emperor to aid him against the French. But the Moorish ruler, being utterly defeated by the French army at Isly, Aug. 14, 1844, was obliged, in order to save himself from the vengeance of France, to turn against the emir; and Abd-el-Kader, who now defied both the French and the Moors, soon found himself deserted by all but his own tribe, and beaten at every point. After continuing the contest as long as possible, he was finally captured and sent to Paris in 1848, although he had surrendered only on condition that he should be sent to Egypt or St. Jean d'Acre. He was kept in France until released by Louis Napoleon in 1852, with a pension of 100,000 francs, on condition that he should not return to Algeria or again take up arms against France. He went to Broussa in Asia Minor, and when that town was destroyed by an earthquake in 1855, he removed to Constantinople. After 1852 he was on the best terms with the French government, and in 1855 visited Paris during the industrial exposition. He subsequently took up his residence in Damascus, where he distinguished himself by generously aiding the Christians during the bloody riots in the summer of 1860. In 1864 he went to Egypt, where he was presented with a piece of land by M. de Lesseps, projector of the Suez canal. During this journey he was also made a member of the order of Freemasons. In 1865 he went to England, and in 1867 attended the great exposition in Paris. In 1870 he offered his sword to the French against the Germans, but the offer was declined. In October, 1871, he addressed a letter to M. Thiers declining to visit France on the ground of ill health, but making suggestions relative to the condition and government of Algeria. Of his 24 children most have died. One of his daughters has become a convert to Christianity. Abd-el-Kader is the author of a book of philosophico-religious meditations, written in exile, in Arabic, and translated into French under the title of *Rappel à l'intelligent, Avis à l'indifférent* (Paris, 1858).

ABD-EL-WAHAB, founder of the Mohammedan sect of Wahabees or Wahabites, born of poor parents, in the Arabian province of Nedjed, about 1691. After long travels through various parts of Arabia, Syria, and Mesopotamia, he finally taught his new religious doctrines in his native region, and died in 1787. (See WAHABEES.)

ABDERA (now *Polystilo*), an ancient city of Thrace, on the S. coast, at or E. of the mouth of the river Nestus. It was a flourishing town in the times of the Persian wars with Greece, and preserved its importance under the Romans. Its inhabitants were proverbial for their ignorance and stupidity, from which ill repute they were not saved by the lustre that Democritus, Protagoras, Anaxarchus, and Hecatæus threw around the name of the town as their birthplace. Lucian, La Fontaine, and Wieland have made them subjects of their satire. Coins of this city are numerous.

ABDERRAHMAN I., surnamed the Wise, the first ruler of the family of the Ommiyades in Spain, born at Damascus in 731, died in 787. After the massacre of his family in the East he retired to Mauritania, where he remained in privacy until he was called to Spain by a deputation of friends, who were tired of anarchy. Abderrahman with a handful of relatives landed at Almunecar on the coast of Andalusia in 755, and soon found himself at the head of a large army. He entered Seville, and was acknowledged as sovereign. Next he advanced against Yusuf el-Feri, the most powerful of the rival emirs, whose army, though of greatly superior numbers, he entirely defeated, firmly establishing himself on the throne of Cordova. It was during these internal dissensions in Spain that the Mohammedans were finally driven out of France, and forced to recross the Pyrenees. The eastern caliphs, who always kept up the idea of maintaining the right of spiritual and temporal rule over the Spanish Moors, anathematized Abderrahman, and despatched two expeditions against him, but in vain. The kingdom of Cordova was at peace when Charlemagne fruitlessly crossed the Pyrenees. Abderrahman built the magnificent mosque of Cordova, designed by himself, at which he is said to have labored an hour a day with his own hands. He planted the first palm tree in Cordova, the stock from which all those now in Spain are descended.

ABDERRAHMAN, sultan of Morocco, born in 1778, died in August, 1859. He succeeded to the throne in 1823, on the death of his uncle, Muley Suleiman. At his succession the practice of paying tribute to the Barbary states and Morocco by independent Christian states, as a guarantee against piracy, had not ceased; but Abderrahman was compelled by the Austrians in 1828 to abandon the claim. In 1844 the prolonged resistance of Abd-el-Kader to the French invasion in Algeria involved Morocco in war with France, and Mogadore and Tangier were bombarded by a French fleet. The contest was terminated by the battle of Isly, Aug. 14, 1844, in which only Abd-el-Kader's Arabs fought well on the Moslem side. Abderrahman was now compelled to turn his arms upon the Algerian emir, and, having collected a large army, finally drove him beyond the frontiers of Morocco into French captivity. Abderrahman was succeeded by his eldest son, Sidi Mohammed, born in 1803.

ABDIAS, of Babylon, the supposititious author of a book called *Historia Certaminis Apostolici* (published at Basel in 1551), in which he asserted that he had seen Christ, that he was one of the 70 disciples, that he had witnessed the deaths of several of the apostles, and that he accompanied St. Simon and St. Jude into Persia, by whom he was made the first bishop of Babylon.

ABDICATION, the abandonment of a throne by a crowned head, was rare and generally compulsory in ancient times. The abdication of Diocletian and Maximian is the best known case in antiquity. Among modern princes who have more or less voluntarily laid down their crowns, we find Charles V. of Spain and Germany (1556); Christina of Sweden (1654); in Poland, John Casimir (1669); in Spain, Philip V. (1724) and Charles IV. (1808); in Savoy and Sardinia, Amadeus VIII. (1434), Victor Amadeus II. (1730), Victor Emanuel I. (1821), and Charles Albert (1849); in France, Napoleon I. (1814 and 1815), Charles X. (1830), and Louis Philippe (1848); in Holland, Louis Bonaparte (1810) and William I. (1840); in Bavaria, Louis I. (1848); in Austria, Ferdinand (1848). The most recent and one of the most remarkable of royal abdications is that of King Amadeus of Spain, who after a reign of two years became disgusted with the difficulties of his position, and on Feb. 11, 1873, resigned the crown for himself and heirs, and returned to his native Italy. Abdication, voluntary or compulsory, is considered by jurists as a personal act, which in no wise affects the right of succession.

ABDOMEN (Lat., of undetermined etymology), the lower part of the body, included between the level of the diaphragm and that of the pelvis. The abdomen consists of its walls or boundaries, the cavity embraced by them, and the organs or viscera included therein. The walls are constituted below by the pelvis, a strong basin-shaped bone with wide flaring edges, upon the upper surface of which the weight of the abdominal organs is sustained; behind by a part of the spinal column and the strong muscles attached to its sides; above by the diaphragm, a vaulted muscular sheet, which forms the partition between the cavity of the abdomen and that of the chest; and in front by the abdominal muscles and their integuments, extending from the lower part of the chest to the pelvis. In front and laterally, the abdominal walls are soft and flexible, being composed only of the skin, fatty tissue, fibrous membranes, and muscles; behind they are more solid and unyielding, owing to the bony framework of the spinal column, which here forms so large a part of their substance. For convenience of anatomical examination and reference, the abdomen is divided externally into three nearly equal transverse bands or zones, an upper, middle, and lower; these zones being again divided into three nearly equal parts or "regions," namely, one middle and two lateral regions in each zone. In the upper zone the middle region is the *epigastrium* (Gr. επι, over, and γαστηρ, the stomach), because a portion of the stomach is situated immediately beneath it; the two lateral regions of the same zone being the right and left *hypochondria* (ὑπο; under, and χονδρος, a cartilage), because these two regions are beneath the cartilages of the lower ribs. In the middle zone, the median portion is the umbilical region, so called because it contains the umbilicus or navel; the two lateral portions are the right and left lumbar regions, or the loins. In the lowermost zone, the middle region forms the *hypogastrium* (ὑπο and γαστηρ), and the two lateral portions the right and left iliac regions, which are occupied on each side by the ilium, or flaring portion of the pelvis.—The cavity of the abdomen is lined by a very extensive and delicate membrane, the *peritoneum* (Gr. περιτειvειν, to extend around), which is also reflected over the surfaces of the abdominal organs, as the covering of a chair or sofa may be reflected or extended over its cushion. In the case of those abdominal organs which remain fixed in their places, like the pancreas and the kidneys, the peritoneum simply passes over their anterior surfaces; but those which are movable, like the liver, stomach, and intestines, are more or less completely invested by it, some of them being attached to the posterior abdominal walls only by the double layer of peritoneum, returning upon itself after having covered their exterior. Thus these organs are covered, and the abdominal walls are lined, by opposite surfaces of the same continuous peritoneal membrane; and these surfaces are moistened by a minute quantity of serous fluid, which enables them to move gently to and fro upon each other, without causing friction or irritation of the parts. The organs contained in the abdomen are as follows: In the upper zone, the liver, stomach, spleen, pancreas, and the commencement of the small intestine; in the middle zone, the mass of the small intestine, with portions of the large intestine, the kidneys, and the suprarenal capsules; and in the lowermost zone, the remainder of the small and large intestines. The very last portion of the large intestine occupies the deeper parts of the cavity of the pelvis, together with the urinary bladder and the uterine organs.—Owing to the flexible character of the abdominal walls, much information may be obtained regarding the condition of the internal organs by external manual examination. If an organ be enlarged, indurated, or displaced, these changes may be detected by careful manipulation, and their increase or diminution may be determined from day to day. If one or more of them be inflamed, this condition is indicated by an unnatural tenderness on pressure; and the exact situation and character of the inflammation may often be fixed by observing whether the tenderness be superficial or deep-seated. Unnatural growths and tumors may be detected in the same way, and their origin ascertained in many cases with considerable approach to certainty. Penetrating wounds of the abdomen are very dangerous, because the contents of the stomach and intestines, if allowed to escape into the cavity of the peritoneum, produce an irritation and subsequent inflammation of the membrane; and this inflammation, spreading in every direction over the contiguous surfaces of the peritoneum, becomes so extensive and violent as almost invariably to produce fatal consequences. Nevertheless, surgical operations in which the cavity of the abdomen is opened, but in which care is taken to prevent the escape or dissemination of irritating substances, have often been performed with a successful result. Sudden and powerful blows upon the abdomen, especially in the region of the epigastrium, are also sometimes fatal, even when none of the internal organs are lacerated, owing to the depressing influence of the shock upon the nervous system.

ABDUL-AZIZ, sultan of Turkey, second son of Mahmoud II., born Feb. 9, 1830, died June 4, 1876. He succeeded his brother Abdul-Medjid, June 25, 1861. Like all heirs to the Turkish throne, he had previously lived in seclusion, and little is known of him during that period except that he was fond of agricultural studies, and established a model farm at Scutari. On mounting the throne he was prodigal with promises of reform, dismissed the corrupt minister of finance, Riza Pasha, reduced his civil list, got rid of the seraglio, declared that he would not indulge in polygamy, and seemed to take a lively interest in ameliorating the condition of the people, and in purging public affairs from fraud and corruption. His intentions were excellent, and he was determined to give to his empire the benefits of European civilization. Hence his journey to France, England, and Austria in 1867, which tended to make him popular in those countries, but alienated from him the sympathies of orthodox Mussulmans. Disregarding the fanatical spirit of the opposition, he allowed foreigners, for the first time in Turkey, to hold real estate, established a public high school after a French model, enriched the capital with various scientific institutions, and endeavored to place the administration of justice upon a more solid basis by ordering the supreme court (1869) to draw up a civil code. In many respects, however, his good intentions were soon overborne by opposition, the power of ancient usages, and his own weakness. He recognized the independence and unity of Italy, negotiated treaties of commerce with England and France, crushed rebellion in Montenegro (1862) and in Crete (1868), and signed in 1871 the treaty of London deneutralizing the Black sea. He tolerated the accession to the Roumanian throne of Prince Charles of Hohenzollern as a matter of policy, but found much trouble in his relations with Egypt. In 1866, in consideration of a vast sum of money, he had, contrary to the Mohammedan law, granted to Ismail Pasha the right of succession to the viceregal throne in a direct line from father to son, while, instead of the title of viceroy, that of khedive was conferred upon him. A similar change was proposed for Turkey, so as to enable Yusuf, the eldest son of Abdul-Aziz, born in 1857 before his accession to the throne, to succeed him, contrary to the ancient institutions of the empire; but it was found impracticable. He was dethroned by the council of ministers on May 30, 1876, and soon afterward found dead. (See TURKEY.) Besides Yusuf, the sultan had four recognized children: Sultana Salikhe, born in 1862; Mahmoud Jemil, born in the same year; Mehmed Selim, 1866; and Abdul-Medjid, 1868.

ABDUL-MEDJID, sultan of Turkey, born April 23, 1823, died June 25, 1861. He succeeded to the throne on the death of his father Mahmoud II., July 1, 1839. Educated in the seclusion of the seraglio, his weak and almost feminine character, his kind disposition, his love of pleasure, his inexperience and want of knowledge, seemed to render him utterly unfit to rule. Mehemet Ali having a second time rebelled, his son Ibrahim had routed the Turkish army near Nizib, June 24, 1839, and was on his march against Constantinople, where a strong party was secretly conspiring to elevate him to the throne. At the same time the capudan pasha or grand admiral betrayed his trust by surrendering the entire fleet to Mehemet Ali. The intervention of England and the German powers checked the Egyptian designs, and by the treaties of July 15, 1840, and July 13, 1841, Turkey was formally admitted into the political system of Europe. The personal share of Abdul-Medjid in all these proceedings was very small indeed. During the earlier years of his reign he was scarcely more than a puppet in the hands of others; but he became keen enough to discern the purposes of his advisers, while his benevolent disposition made him anxious to do justice and to promote the welfare of his subjects. On Nov. 3, 1839, acting under the advice of Reshid Pasha, he convoked all the grand officers of the empire, the sheiks of the dervises, the three patriarchs of the Christian sects, the three high rabbis of the Jews, the foreign diplomats, the ulemas and mollahs, the trustees of all corporations at Constantinople, and citizens generally, around the pavilion of Gulhane in the imperial park, and there promulgated the *Hatti-Sherif* or fundamental law, the bill of rights, intended to be the basis of a political reconstruction. Equality before the law was guaranteed to all subjects of the sultan, without distinction of creed or nationality; an equitable mode of taxation was to be introduced; a just system of conscription was also promised. More than once the Hatti-Sherit was confirmed and repeated in new decrees; and in 1845 the sultan went so far as to call a kind of congress, consisting of representatives from different provinces of the empire. A board of education was instituted in 1845, and a system of free public schools established in 1846. On Feb. 18, 1856, the *Hatti-Humayun* was published, being the draught of a liberal constitution. While from 1840 to 1853 almost every year of Abdul-Medjid's reign was marked by insurrections in one province or another, the court was the theatre of incessant intrigues, amid which the position of the sultan was scarcely more honorable or important than that of a nominally sovereign king in the East Indies. For several years he led a dissolute life, but afterward he appeared to mend his ways in some degree, and improved his education by studying French, mathematics, history, and music. European customs and fashions became more and more prevalent at court, concerts and Italian opera were established permanently, and in 1854 the sultan, "the supreme father of the faithful," even went to a ball. When in 1849 the defeated Hungarian patriots sought refuge on Turkish soil, Abdul-Medjid preferred running the risk of a formidable war to betraying those who had confided in the sacredness of hospitality as taught by Mohammed. He had seven sons and two daughters, but was succeeded, according to law, by his brother Abdul-Aziz.

ABECEDARIANS, a sect which appeared among the Anabaptists of Germany in the 16th century, led by one Storck, previously a disciple of Luther. They held that without the aid of study the Holy Spirit would convey directly to the understanding a knowledge of the Scriptures, and that therefore it was better not to know how to read. Carlstadt, a Wittenberg divine, and at one period of his life a bitter antagonist of Luther, is said to have countenanced the Abecedarians by tearing off his doctor's gown and burning it.

A'BECKET, Gilbert Abbott, an English humorous author, born in London in 1810, died in Boulogne, April 28, 1856. He was called to the English bar in 1841. He was a contributor to both the London "Times" and "Daily News," and was special correspondent of the "Times" in a celebrated poor law inquiry, in which he displayed great judgment. He was one of the earliest contributors to "Punch," and wrote the "Comic Blackstone," comic histories of England and Rome, and a great number of burlesque plays. He was appointed one of the police magistrates of London. On his death the queen, on the recommendation of Lord Palmerston, granted his widow a pension of £100 a year.

ABEEL, David, D. D., an American clergyman, born in New Brunswick, N. J., June 12, 1804, died in Albany, N. Y., Sept. 4, 1846. He studied theology at the seminary in New Brunswick, and after preaching for more than two years at the village of Athens, N. Y., his health gave way, and in October, 1829, he sailed for Canton as a chaplain of the seaman's friend society, but at the end of a year's labor placed himself under the direction of the American board. He visited Java, Singapore, and Siam, studying the Chinese tongue, when his health failed him entirely, and he returned home in 1833 by way of England, visiting Holland, France, and Switzerland, and everywhere urging the claims of the heathen. He also assisted in England in forming the society for promoting female education in the East. In America he published a description of his life in China and the adjacent countries, and a work entitled "The Claims of the World to the Gospel." In 1838 he returned to Asia, and visited Malacca, Borneo, and other places, settling at Kolingsu. Once more his health gave way, and he returned home in 1845.

ABEGG, Julius Friedrich Heinrich, a German jurist, born in Erlangen, March 27, 1796, died in Breslau, May 29, 1868. In 1818 he received his legal doctorate, and in 1820 commenced delivering lectures at Königsberg. In 1826 he became professor of law at Breslau, and in 1846 was delegate of the legal faculty at Breslau to the Prussian national synod. He was a very influential writer upon criminal administration. One of his last works was *Entwurf einer Strafprocessordnung für den preussischen Staat* (Leipsic, 1865).

ABEL, the second son of Adam. He was a shepherd, and was slain by his brother Cain, from envy. It has been maintained by some fathers of the church that Abel never married; hence the sect of Abelites.

ABEL DE PUJOL. I. Alexandre Denis, a French painter, born in Valenciennes, Jan. 30, 1785, died in Paris, Sept. 28, 1861. He was a pupil of David, and achieved distinction as a historical painter of the older classical school. Many of his works may be found in French churches. **II. Adrienne Marie Louise Grandpierre Deverzy**, wife of the preceding, to whom she was married in 1856, born at Tonnerre, in the department of Yonne, in 1798. She was a pupil of her future husband, and made her début in 1836 by a picture representing a painter's studio. She afterward painted portraits, a scene from Gil Blas, &c.—A son of Abel de Pujol, born about 1815, is also a painter.

ABÉLARD, or Abailard, Pierre, a French scholastic philosopher, born near Nantes, in Brittany, in 1079, died April 21, 1142. Having made early and rapid progress in the learning of the age, he relinquished his family inheritance in favor of his brothers, that he might be free from the cares of property, and have no impediment to the gratification of his thirst for knowledge. At the age of sixteen he betook himself to Paris, and inscribed himself among the pupils of William de Champeaux, a famous professor. In the public disputations which were the fashion of the day, Abélard had no superior. In a discussion on the origin and nature of ideas, he made such a brilliant display of ability, learning, and logical acuteness, that he endangered the supremacy of De Champeaux in the seat of learning where he had so long held sway; and his jealousy was at a high pitch when Abélard, though only 22 years old, opened a school of philosophy at Melun, near Paris, a favorite retreat of the court, which was well attended by students who deserted the other teachers. Abélard's failing health compelled him for a time to retire to his native air; but so soon as he had recruited his strength, he returned to the scene of his triumphs, and resumed his place as pupil at the feet of his old master. De Champeaux became a monk, but still continued his secular pursuits, and the fiery debates were renewed, in which Abélard again came off victor. De Champeaux was made bishop of Châlons, and his new power was exercised to crush his adversary with other weapons than those of argument. The canon Fulbert had a niece of whose intellectual and personal accomplishments he was justly proud. Admiring the talents and distinction of Abélard, he invited him to complete the education of his beautiful niece. Abélard boasted that he taught to Héloïse the three languages necessary for the understanding of the Scriptures. The relation of master and pupil was not long preserved; a warmer sentiment than esteem seized their hearts, and the unlimited opportunities of intercourse which were afforded them by the canon, who confided in Abélard's age (he was now almost 40) and in his public character, were fatal to the peace of both. The condition of Héloïse was on the point of betraying their intimacy. They fled. Fulbert pursued, and Abélard having proposed marriage, the enraged uncle consented. On account of Abélard's ecclesiastical ambition, this marriage was to be kept secret; but Fulbert divulged the fact, which Héloïse, from a spirit of devotion to her lover, denied. Exasperated at his niece's perverseness, Fulbert punished her, and she then fled to Abélard, who placed her in the nunnery of Argenteuil. Fulbert now abandoned himself to a transport of savage vindictiveness, and, watching his opportunity, burst into Abélard's chamber with a band of ruffians, and gratified his revenge by inflicting on him an atrocious mutilation. Fulbert was deprived of his benefice, his goods were confiscated, and his accomplices punished by undergoing the treatment they had inflicted on Abélard. In this affair, Abélard, in his memoirs, admits his own excessive culpability; he states that he was under evil influence, that he abused the confiding trust of his friend Fulbert, and that he deliberately plotted the seduction of Héloïse, who, on her part, was far less blamable than he. The unhappy man, on his recovery from the outrage, sought an asylum in the monastery of St. Denis, and became a monk. Héloïse took the veil at Argenteuil. But Abélard's spirit was not crushed; he continued his public lectures. His great popularity soon drew a crowd of eager students from all parts, and this roused the malice of his old opponents. He abandoned the field of profane philosophy, and addressed himself to theology. His writings on the Trinity, maintaining doctrines to which some of the tenets of the modern Unitarians bear a close resemblance, were made the point of attack. In 1121 he was accused of heresy, and a council being called at Soissons, in which he was not allowed to defend his doctrines, his works were adjudged heretical, and ordered to be burned. The monks of St. Denis, who were desirous of relieving themselves of a brother whose strict life was a rebuke to their own, now took offence at his opinion that Dionysius the Areopagite was not the founder of their abbey. For this impiety they followed him up so fiercely that he was compelled to flee, and in a desert place between Nogent and Troyes he built himself a rude hermitage, after the fashion of an anchoret. Many of his pupils followed him into this retreat, and with their assistance he founded the Paraclete. He was now elected abbot of the monastery of St. Gildas de Ruys, in the see of Vannes, but this was a source of further trouble. The feudal lord of the monastery had deprived the monks of their territory for their irregular life, which Abélard himself was no less desirous of reforming, and thereby ran the risk of assassination within the walls, while, in his desire to maintain the temporal rights of the convent, he was in little less danger without. He regretted the seclusion and independence of the Paraclete. Héloïse had been elected abbess of Argenteuil. The demesne of the convent had been claimed by the monks of St. Denis, and the nunnery suppressed. Héloïse and her nuns were without home or shelter. In this emergency Abélard offered them the Paraclete to found an institution, and went to assist personally in their establishment there, which was confirmed by a bull of Innocent II. This reunion, after a separation of eleven years, was precious to both; and he afterward made frequent visits to the Paraclete. His doctrines once more brought persecution upon him. This time St. Bernard was his opponent. Abélard was charged with dogmatizing on the power and nature of the divine essence, thereby attempting to reduce to human comprehension that which Bernard affirmed was, and ought to be, held incomprehensible by all Christians. In 1140 a council was held at Sens, in which Louis VII. in person presided. Abélard's opinions were again adjudged heretical, and he was sentenced to perpetual silence. To escape this decree, he appealed to the pope and set out for Rome, and on his road thither he was able to interest Peter the Venerable, abbot of Cluny, in his case. This friend used his efforts on his behalf, and procured an absolution from the holy father. Abélard died at St. Marcel, near Châlon, whither he had gone from Cluny for his health. His body was delivered to Héloïse, and by her interred at the Paraclete, where she herself was afterward buried by his side. In 1792 the Paraclete was sold, and the remains of the two lovers were removed to the church of Nogent-sur-Seine. They were exhumed in 1800 and placed in the garden of the Musée Français in Paris, and in 1817 were deposited beneath a mausoleum in the cemetery of Père la Chaise.—The position of Abélard in the philosophical movement of his age is well described by M. Cousin: "A hero of romance within the church, a refined spirit in a barbarous age, a founder of a school, and almost a martyr to an opinion, everything conspired to make Abélard an extraordinary personage. But of all his titles, that which gives him a separate place in the history of the human mind is his invention of a new philosophical system, and his application of this system and of philosophy in general to theology. Doubtless before Abélard might be found some rare examples of this dangerous process, although a useful one, even in its errors, to the progress of reason; but it is Abélard who established it as a principle; who contributed more than any other to found scholasticism, for scholasticism is nothing else. After Charlemagne, and even before, there was taught in several places a little of grammar and logic; religious instruction, too, was not wanting, but this instruction was limited to a more or less regular exposition of sacred *dogmas*; it might suffice for faith, but did not nurture intelligence. The introduction of dialectics into theology could alone produce that spirit of controversy which is the vice and the honor of scholasticism. Abélard is the chief author of this introduction; he is, then, the principal founder of the mediæval philosophy, so that France has not only given to Europe, through Abélard, the scholasticism of the 12th century, but also at the beginning of the 17th century has given, in Descartes, the destroyer of this same scholasticism, and the father of modern philosophy. And there is no inconsistency in this; for the same spirit which had raised the ordinary religious instruction to that systematic and rational form which we call scholasticism, would alone be able to rise above that form, and to produce philosophy properly so called. Thus the same country was able to support, with an interval of a few centuries, Abélard and Descartes. We discover also, through the many differences of these two men, some striking resemblances. Abélard sought to give an account of the only thing which could be studied in his time—theology; Descartes has given account of what it was permitted to study in his time—man and nature. The latter recognized no authority but that of reason; the former undertook to introduce reason into authority. Both doubt, both investigate; they seek to understand all that is possible to man, and to rest only in certainty. This is their spirit in common, which they borrow from the French spirit, and this fundamental feature of resemblance causes many others; as, for example, that clearness of language which springs spontaneously from definite and precise ideas. It may be added that Abélard and Descartes are not only both Frenchmen, but that they belong to the same province, to that Brittany whose inhabitants are distinguished by so lively a sense of independence and so strong a personality. Thence, in these two illustrious compatriots, with their native originality, with dispositions to admire moderately what was done before their time and in their time, came the love of independence, pushed often into a quarrelsome spirit; confidence in their own strength and contempt of their adversaries; more of logical connection than of solidity in their opinions; more sagacity than comprehensiveness; more of vigor in the temper of their mind and character than of elevation and profoundness in their thought; more of ingenuity than of common sense, satisfied with the perfection of their own views rather than rising to universal reason." —The works of Abélard were collected by François Amboise and André Duchesne, and first published at Paris in 1616. The best edition of his works is that of Cousin (Paris, 1850), who has accompanied the principal writings of the author with admirable critical and expository notices. The narrative of his life is contained in his autobiography entitled *Historia Calamitatum suarum.* Pope has versified some of the supposed letters between the lovers. The most important modern works on the biography of Abélard are by Fessler, *Abälard und Heloise* (2 vols., Berlin, 1806); Mme. Guizot, *Essai sur la vie et les écrits d'Abailard et d'Héloïse* (Paris, 1839); Rémusat, *Abélard* (2 vols., Paris, 1845); Böhringer, *Kirchengeschichte* (vol. iv., 1854); Wilkens, *Peter Abälard* (Göttingen, 1855).

ABELITES, Abelians, Abelonians, or **Abelonites,** a sect of Christians, probably of Gnostic origin, who, though practising marriage, denounced sexual intercourse as a service of Satan, maintaining that thereby original sin was perpetuated. As Abel had not been married, they took their name from him. Their numbers were recruited by children whom they brought up in pairs of each sex under one roof. They existed about the 4th century, and are mentioned by St. Augustine. They lived near the city of Hippo in Africa.—The name Abelites was given in the 18th century to the members of a secret society, whose professed object was to cultivate the honesty and candor of Abel, whom they took for their model and patron.

ABEN, Aven, Ebn, Ibn, Arabic patronymic prefixes to proper names, corresponding to the Hebrew *ben*, son of. (See Ben.)

ABENAQUIS, or **Abnakis** (Men of the Eastern Land), a group of Indian tribes of the Algonquin family, originally occupying the present state of Maine, and comprising the Canibas or Abenaquis proper on the Kennebec, the Etechemins or Malecites as far as the river St. John, and, according to some, the Pennacooks on the Merrimack and the Sokokis west to the Connecticut. They were approached early in the 17th century by the English and French, but adhered to the latter, whose missionaries converted most of them to Christianity. They figure constantly in the New England border wars under the name of Tarranseens, but were finally overthrown and their missionary Râle killed at Norridgewock in 1724. Many had emigrated to Canada, where two villages still remain, bearing the name Abenaquis, at St. Francis and Becancour. The remnants in Maine are called Penobscots and Passamaquoddies, from the rivers on which they reside. Another remnant is in New Brunswick, near Fredericton. During the American revolution they embraced the cause of the colonies under their chief Orono. Their language was thoroughly studied by Father Sebastian Râle, whose dictionary is still highly important. Their history has been written by the Rev. E. Vetromile (New York, 1866), and more fully by the Rev. J. A. Maurault (Sorel, 1866).

ABENCERRAGES (Arabic, *Ibn Serraj* or *Zerragh*), the name of a distinguished Moorish family, whose mortal feud with the Zegris, another noble family of Granada, contributed to the fall of the Granadian monarchy. The quarrel originated in the varying fortunes of Mohammed VII. of Granada, in the earlier part of the 15th century, who was alternately a monarch and an exile, and whose cause the Abencerrages espoused with unswerving fidelity. It is told that one of the youths of the Abencerrages, having loved a lady of the royal house, was climbing to her window when he was discovered and betrayed, and the king, in revenge for the outrage on the sanctity of his harem, shut up the whole family in a tower or court of the Alhambra, and, letting loose the fury of their hereditary enemies, had them butchered in cold blood. This tragical tale has been the foundation of many poetical productions. The inexorable criticism of our century has, however, demonstrated the fictitious character of the romantic story. (See Conde's *Historia de la dominacion de los Arabes en España*, Madrid, 1829.)

ABENDBERG, one of the secondary elevations of the Bernese Alps, rising from the plateau of Interlachen or Bernese Oberland, in the canton of Bern, Switzerland, S. W. of the village of Interlachen, its northern base abutting on the lake of Thun. It rises about 3,500 feet above the plateau, and 5,300 above the sea level. Its southern slope is very fertile, and the lower portion heavily wooded. It is regarded as one of the most salubrious regions of the Alps. In 1842 Dr. Louis Guggenbühl selected a site on the southern slope, several hundred feet below the summit, for an asylum for cretins, whom he hoped by careful treatment and the health-giving influences of the climate to restore to reason and healthful development. The institution did not accomplish all that was expected from it, and, after being maintained for 18 or 20 years, was on the death of its founder given up. (See GUGGENBÜHL, LOUIS.)

ABEN EZRA, properly **Abraham ben Meir ben Ezra**, one of the most esteemed biblical commentators among the Jews of the 12th century, born in Toledo, Spain, in 1093, died in Rome in 1167 or 1168. He was also distinguished as a physician, mathematician, astronomer, poet, and grammarian. He was poor, and travelled extensively, lecturing before large audiences. His writings, some of which have been translated into Latin, are numerous, and evince originality, boldness, and independence. His style is pithy and often epigrammatic.

ABENSBERG, a small town of Lower Bavaria, 18 m. S. W. of Ratisbon; pop. about 1,600. It is believed to have been the Abasinum of the Romans. It has a thermal spring, and contains the ruins of a fine castle. On April 20, 1809, Napoleon fought and defeated the Austrians near Abensberg, who lost 12 guns and 20,000 men, including the prisoners made on the following day. This was the precursor of the victories of Landshut and Eckmühl.

ABERBROTHWICK. See ARBROATH.

ABERCROMBIE, James, a British general, born in Scotland in 1706, died April 28, 1781. He was commander-in-chief in America in 1756, and again in 1758, on the retirement of Loudoun. He attacked Ticonderoga July 8, at the head of 15,000 men, and was repulsed with a loss of nearly 2,000 killed and wounded. He then retreated to his fortified camp on the south side of Lake George. He was superseded by Sir Jeffery Amherst, who retook Ticonderoga and Crown Point. In 1759 he returned to England, and was afterward a member of parliament and deputy governor of Stirling castle.

ABERCROMBIE, John, M. D., a Scottish physician, born in Aberdeen, Nov. 11, 1781, died in Edinburgh, Nov. 14, 1844. He contributed valuable papers to the "Edinburgh Medical and Surgical Journal." His principal works are: "Pathological and Practical Researches on Diseases of the Brain and Spinal Cord" (Edinburgh, 1828, 1830); "Inquiries concerning the Intellectual Powers of Man and the Investigation of Truth" (1830); "Philosophy of the Moral Feelings" (1833). The university of Oxford conferred on him the honorary degree of doctor of medicine, and in 1835 Marischal college elected him its lord rector. He was considered the first physician in Scotland.

ABERCROMBY, Sir Ralph, a British general, born in 1738, died March 28, 1801. He was descended from a good Scottish family, entered the army, and became major general in 1787. In 1793 he went to Holland in the unsuccessful Walcheren expedition, and gained universal esteem by his humanity and soldierlike qualities. He was now made commander-in-chief in the West Indies, and took several of the French West India islands. After his recall he was made lieutenant governor of the Isle of Wight, and showed his judgment and presence of mind in suppressing a mutiny of the Highland regiments, who had revolted because they were required to serve as marines. On the breaking out of the rebellion of 1798 in Ireland, he was sent there as commander-in-chief, but his distaste for the service was so decided that he was removed to Scotland. In 1799 he again served in Holland. In 1800 he was sent to Egypt to act against the French invasion of that country, and on March 8, 1801, he made good his landing at Aboukir in the face of a hostile force, but with considerable loss. He encamped near Alexandria, and was attacked by the French, and on the 21st the battle of Alexandria was fought. Sir Ralph was severely wounded early in the action, but concealing his wound, he continued on the field, giving his orders, until after the action was over, and the French had been entirely defeated. His dangerous condition was then made known. He died a week afterward, and his remains were conveyed to Malta and there interred. His widow was created a peeress as Baroness Abercromby, with succession.

ABERDARE, a town and parish of Glamorganshire, S. Wales, at the junction of the river Dare with the Cynon, 20 m. N. N. W. of Cardiff, and 4 m. S. W. of Merthyr Tydvil; pop. of the parish (25 sq. m.) in 1861, 32,299; in 1871, about 40,000. In 1841 the population was but 6,471. The increase is due to the great extension of coal and iron mining. The coal is largely consumed in the iron mills of the town, and a considerable amount is exported. There are many fine public and private buildings, good water works, and a public park.

ABERDEEN. I. New, the capital of the county of Aberdeen, Scotland, situated between the rivers Don and Dee, and near the mouth of the latter, 512 m. from London, and 114 m. N. by E. from Edinburgh; pop. in 1871, 88,125. It was styled New Aberdeen after its restoration in 1336, having been burned by Edward III. It is incorporated by royal charter granted by William the Lion in 1179. The public edifices, chiefly of granite, are the East and West church, the Marischal college, the royal infirmary, the town house and tolbooth or jail, the post office, mechanics' hall, and several others erected within the last few years. There is a fine one-arch bridge of 132 feet span over the river Dee, opening into Union street, which is 70 feet wide and a mile long, and is the chief thoroughfare of the city. Over the Don, at the N. end of the town, is a bridge of five arches and 75 feet span. There are about 50 religious edifices of all denominations, the largest number being Presbyterian. The East and West church is a noble pile 170 feet long, with a spire 150 feet high. The town house and tolbooth are situated in Castle street, and have a spire 120 feet high. Marischal college, founded by George Keith, earl marischal, in 1593, has an observatory and good collection of instruments, a museum, and a fine library. Since 1858 it has been incorporated with King's college as the university of Aberdeen, which has now 21 professors and over 600 students. Gordon's hospital, founded in 1729 by Robert Gordon, is a school for boys, who are admitted from 8 to 11, and kept until 15 years of age, and on quitting the foundation are entitled to receive an apprentice fee of £10 or £7. The other charitable institutions are the royal infirmary and lunatic asylum, the general dispensary, two ophthalmic institutions, the Cruickshank asylum for the blind, Dr. Carnegie's hospital for destitute female children, the Midbellie fund for granting pensions of £5 to £15 to widows, and the female orphan asylum, which is supported by voluntary contributions, and whose inmates are trained for domestic service. The cross on the east of Castle street is a monumental structure of remarkable beauty. The market is commodious, built in two floors, with galleries

Aberdeen from the Cross.

running around the whole. The commerce and manufactures of Aberdeen are extensive. Ships of 1,000 to 1,500 tons are built here. Cotton manufactures employ 4,000 hands, linens and woollens each as many more. The Aberdeen granite is used all over Great Britain, and largely exported. Aberdeen is actively engaged in the northern whale fishery. The Victoria dock has a water area of 40 acres. There are water works which supply the town from the river Dee. There is railway communication direct with London. The town is governed by a provost, four bailies, a dean of guild, and a treasurer, with 12 other members of council. **II. Old,** a town of great antiquity, situated one mile N. of the new town, near the mouth of the Don; pop. about 2,000. King's college, founded in 1494, is situated here.

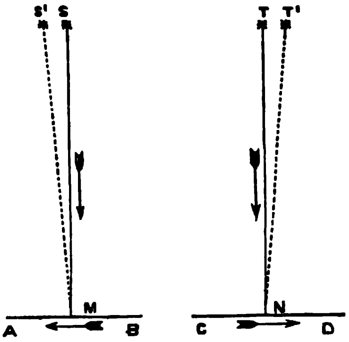
ABERDEEN, Earls of, viscounts of Formartin and barons of Haddo, Methlic, Tarvis, and Kellie in the Scottish peerage, and Viscounts Gordon in that of the United Kingdom. The family is an offshoot of the ancient Scotch family of the Gordons.—Sir John Gordon of Haddo was created a baronet in 1642 by Charles I., as a reward for his services in the battle of Turriff between that monarch and the parliamentary forces. Being taken prisoner after a desperate defence of the house of Kellie, he was long imprisoned in the nave of the ancient cathedral of St. Giles at Edinburgh, which from him took the familiar name of "Haddo's Hole," and was at length beheaded in 1645. His estates remained under sequestration till the restoration of Charles II., when they were restored to his eldest son, Sir John Gordon, who died in 1665.—Sir George Gordon of Haddo, lord high chancellor of Scotland, was in 1682 elevated to the Scottish peerage, by the titles above mentioned. On the revolution the new earl resigned office, and declined taking the oaths of allegiance to William of Orange, but he appeared again at court in the reign of Queen Anne. He opposed the union of Scotland and England from his seat in parliament, and died in 1720, aged 83.—George Hamilton Gordon, 4th earl, born in Edinburgh, Jan. 28, 1784, died Dec. 14, 1860. He was educated at Harrow, and at St. John's college, Cambridge, where he graduated in 1804. While still a young man he founded a club, the members of which must have made a journey to Greece. In 1806, though only 22, he was elected as one of the 16 Scottish representative peers, and so remained until he was created a peer of the realm in his own right in 1814, as Viscount Gordon of Aberdeen. In 1813 he was sent to the court of Vienna as a secret envoy to detach Austria from her enforced alliance with Napoleon. He succeeded, and was soon afterward again sent to Vienna, and arranged the preliminaries between the emperor Francis and Joachim Murat, king of Naples, for the restoration of the Bourbons to the throne of Naples. During Canning's ministry he was in opposition. In 1828, the duke of Wellington having formed a ministry on high tory principles, Aberdeen became secretary of state for foreign affairs, remaining in office till November, 1830, and opposing the Greek war of independence, but favoring the abolition of the test and corporation acts, and the Catholic emancipation act, while resisting the movement for parliamentary reform. On the death of George IV. Aberdeen resigned with his colleagues. He afterward took a conspicuous part in endeavoring to reunite the Scottish national church. From 1841 to 1846 he was again secretary for foreign affairs, in the ministry of Sir Robert Peel, and participated in settling the northeastern and Oregon boundary questions with the United States. On Dec. 28, 1852, he became prime minister, but was compromised in public opinion by his attempt to evade the Crimean war, and by its blunders after it was begun, and was compelled to resign Feb. 1, 1855, when he was made a knight of the Garter. He had been president of the society of antiquaries, and in 1822 published "An Inquiry into the Principles of Beauty in Grecian Architecture."—George Hamilton Gordon, 6th earl, born Dec. 10, 1841, lost at sea Jan. 27, 1870. He succeeded to the title in 1864. In 1866 he embarked in a sailing vessel from Aberdeen for St. Johns, N. B., and during the voyage volunteered to fill the place of a disabled seaman. This occupation he resumed after some time spent in travel, made several short voyages under the name of George Henry Osborne, acted as a commercial agent at Pensacola, and was licensed as a mate in New York in 1867, and as a captain in 1868. In January, 1870, he shipped as mate of the three-masted schooner Hera, bound from Boston to Melbourne, and on the fourth day out was swept overboard in a storm. He had for some time kept his family advised of his wanderings, but as all replies to his letters miscarried, he ceased writing. An agent sent out in search of him succeeded with great difficulty in tracing his subsequent career.

ABERDEENSHIRE, a county of Scotland, on the N. E. coast, between lat. 56° 52′ and 57° 42′ N., and lon. 1° 49′ and 3° 48′ W.; length, 87 m.; greatest breadth, 36 m.; area, 1,985 sq. m., or 1,270,740 acres, being about one sixteenth of all Scotland; pop. in 1871, 244,607. It contains 83 parishes and parts of six others, and is divided into the districts of Mar, Formartin, Buchan, Garioch, and Strathbogie. On the S. and S. W. borders of the county are the Grampian hills. The Highlands of this district include some of the highest mountains in Scotland, Ben Macdhui, Cairntoul, Ben Avon, and Cairngorm, from which last the fine yellow pebble so much used in Highland dress and ornaments takes its name. The Scottish kings used to hold formidable gatherings to hunt the red deer in the wilds of Braemar; and the abundance of carefully preserved game makes the district still a favorite rendezvous of sportsmen. The Bullers of Buchan, near Peterhead, are also an attractive object to the tourist. The chief rivers are the Dee and the Don. The climate, except in the mountain districts, is mild, and wheat prospers. Cattle, sheep, pigs, eggs, and butter are transported by steam from Aberdeen to London, to the value of about £1,000,000 annually. Granite is the most important mineral production. Besides the queen's estate of Balmoral, Aboyne castle, belonging to the earl of Aboyne, Haddo house, seat of the earl of Aberdeen, Huntly lodge, of the duke of Richmond, and Forbes castle are noteworthy.

ABERDEVINE (*carduelis spinus*), also called the siskin, a small European song bird, which breeds in the north of Europe, and visits England, France, and Germany during the winter season only. It somewhat resembles the green variety of the canary bird, with which it is so far connected that it will interbreed with it in confinement, when the produce is what are known by bird fanciers as mules. Its length is about 4¼ inches, its tail short and forked. Its upper parts are variegated with olive brown, yellow, and pale green, the feathers being edged with yellow; its bill and legs are light horn brown. Its note is soft and pleasant. It builds in the topmost branches of pine trees, and lays four or five bluish white eggs, speckled with purplish red. Its Latin name *carduelis* expresses its fondness for the seeds of the thistle.

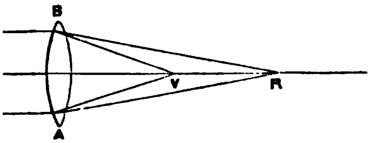
ABERNETHY, John, an English surgeon, born either in Scotland or Ireland in 1764, died at Enfield, April 18, 1831. He was a pupil of Sir Charles Blick, surgeon to St. Bartholomew's hospital, London, and afterward of the celebrated John Hunter. Early in his career, in a work entitled "The Constitutional Origin and Treatment of Local Diseases," he established the fundamental principles upon which surgical operations have since been conducted. His bold and successful operations of tying the carotid and external iliac arteries established his reputation, and almost revolutionized surgery. He acquired great distinction as an anatomist and physiologist, succeeded Sir Charles Blick at St. Bartholomew's, was appointed surgeon to Christ's hospital in 1813, and in 1814 professor of anatomy and surgery to the royal college of surgeons. His works became text books in nearly all the medical colleges in Europe and America. He contributed the anatomical and physiological articles to Dr. Rees's "Cyclopædia" from A to C, and published numerous tracts, treatises, and surgical and physiological essays. One of the most popular and well known of his works was his "Surgical Observations," the perusal of which he almost invariably recommended to his patients. His last production (issued a few months prior to his death) was a collected and revised edition of his "Lectures on the Theory and Practice of Surgery." His writings are remarkable for clearness, conciseness, and simplicity. His simple and impressive style of lecturing never failed to enchain his audience, despite his dogmatism and contempt of others' opinions. His private character was admirable, but in public his manners were uncouth, churlish, and capricious. Many anecdotes of his eccentricities are current.

ABERRATION. I. Aberration of Light, the alteration of apparent position in a heavenly body, due to the fact that the observer is carried along by the earth's motion, the velocity of which is a measurable quantity in relation to the velocity of light. The aberration of light is therefore due to the combined effect of the transmission of light and of the earth's motion. The solution of all problems to which it gives rise is due to the astronomers of the last century; their calculations are in perfect accord with the minutest practical observations, made with the most elaborate and largest astronomical instruments constructed in some observatories chiefly for the purpose of measuring this amount of aberration. If, at a time when rain drops were falling in a perfect calm perpendicular to the earth's surface, we were standing on a platform car on a railroad track, and rapidly moving forward or backward, the drops would strike us under an angle deviating from the perpendicular in proportion to the swiftness of our motion. The direction of this deviation would in either case be toward the side we are moving to, and this is exactly the case with the light coming to us from the heavenly bodies. This is evident when we compare the direction of the rain drops with that of the light, and that of the car with the motion of the earth in its yearly orbit. If now the direction in which light reaches us be changed, the apparent position of the body from which the light proceeds must be changed also. Let A B represent a small portion of the earth's orbit, and S M the ray of light from a fixed star S; the motion of the earth from B toward A will cause the light to come in the direction S′ A, and the star will appear to stand in S′. If C D represents a small portion of the earth's orbit half a year later, thus moving in an opposite direction, the star T will for the same rea-

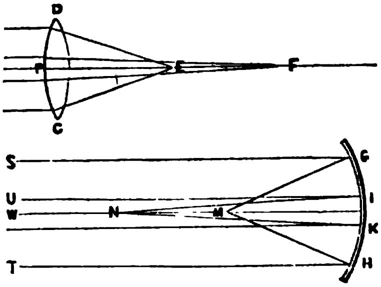


Aberration of Light.

son appear to stand in T′. If the velocity of our earth was so much slower as to be for our most delicate instruments incomparable to the velocity of light, no apparent influence would be exerted on the apparent direction, and there would be no appreciable aberration; but the relation happens to be within the pale of actual measurement. Taking the length of the earth's yearly orbit in round numbers at 600,000,000 miles and the length of the year at 31,556,931 seconds, the velocity of our earth is nearly 19·2 miles per second; and light being transmitted at the rate of 192,000 miles per second, it is clear that it travels about 10,000 times faster than the earth. If now we consider that an equal velocity would change the direction of the perpendicular, or 90°, into its half, or 45°, we see that a velocity of only $\frac{1}{10,000}$ would deviate the angle approximately $\frac{1}{10,000}$ of 45°, or about 16 seconds. This, however, is a rough estimate; trigonometrically calculated, we obtain more, namely, 20 seconds. This now must be the maximum aberration produced by the yearly motion of the earth on the position of all stars observed at right angles to the direction of that motion. They must all appear displaced to an amount of 20″ forward, and this is in fact observed in all heavenly bodies at right angles to the plane of the ecliptic. As after six months the earth moves in an opposite direction at the other side of the sun, this displacement must be observed in an opposite direction after the lapse of every half year, making a total displacement of 40″ in the position of all the stars situated near the poles of the ecliptic; therefore they appear to have a yearly movement in small ellipses of 40″ mean diameter, or about one fortieth the diameter of the moon. **II. Aberration in Optical Instruments.** As white light is composed of colored rays of different refrangibility, any kind of refraction must split it up into rays of different colors. This is called dispersion. As the convex lenses used in telescopes, microscopes, and other optical instruments refract the light to focal points, this dispersion causes an infinite number of foci. Those consisting of the most refrangible rays, the violet, are the nearest to the lens, and they follow in the order of their refrangibility—blue, green, yellow, orange, and red; the focus of the last is the furthest distant from the lens. This grand defect, called chromatic aberration, is corrected by the construction of achromatic lenses. (See Achromatic Lens.) The course of the rays producing chromatic aberration is represented in the adjoined figure, in which A B is the lens, V the focus of the most refrangible or violet, and R that of the least refrangible or red rays.—Another defect, called spherical aberration, arises from the nature of the curve used in making lenses and reflectors. Geometry proves that parallel rays can only be refracted and reflected to a single focus by a parabolic curve; however, lenses and reflectors are ordinarily ground as parts of a sphere, which differs from a parabola in the fact that in the latter the amount of curvature increases toward the centre or axis. The consequence is that a section of a sphere, not having curvature enough toward this point, has an infinite number of foci at different distances; those formed by parts nearest to the axis will be the furthest off, while those formed by the refractions or reflections near the circumference of the lens or mirror will be the nearest. The two figures given here represent the case of this aberration by refraction and reflection: C D is the lens, of which the rays passing near the centre P are united in F, while the rays passing near the circumference D C unite nearer to the lens in E. G H is the curved mirror or reflector which reflects the rays U I and W K falling on it near its centre in N, while the rays S G and T H, falling on it near the circumference, are brought together much nearer in M. When the aperture of the lens or mirror is small, for instance only 5° or about $\frac{1}{72}$ part of the circumference, these differences are practically inappreciable; but when the aperture must be large, as is the case with astronomical telescopes, peculiar arrangements are contrived, so that in making the lenses or reflectors a curve is obtained as nearly as possible of the parabolic form.



Chromatic Aberration.



Spherical Aberration.

ABERYSTWITH, a seaport town of Cardiganshire, Wales, near the outlet of the Ystwith and Rheidiol, 39 m. N. E. of Cardigan; pop. in 1871, 6,896. It is a bathing place, and has considerable commerce and extensive fisheries. In the vicinity are many lead mines.

ABEYANCE (law Fr. *abbayer*, to expect, wait for; Fr. *bayer*, to gape), a law term implying expectation, suspense, though by the signification preferred by the best authors the thing in abeyance is conceived to be in the remembrance or consideration of the law. The title to a ship captured in war is said to be in abeyance until condemnation to the captor by the prize court. So an estate of inheritance or the fee was said to be in abeyance when there was no one in being in whom it could vest, as in the case of a grant to A for life, remainder in fee to the heirs of B, who was then living: as there can be no heir of a living man, the fee was said to be in abeyance until B's death. Mr. Fearne, an acute writer upon the law of real property, denounced the theory of an abeyance as an absurd fiction; and he contended with great ability that in the case just supposed the estate of inheritance was not in abeyance during B's life, but remained in the grantor of the life estate until the happening of the condition on which it might pass to B's heirs devested him of it. The principle of abeyance, however, has always stood fast in the law, and has carried with it very practical results. The plan of the feudal system, which required that there should always be some one ready to render the military and other feudal services to the lord, fixed the *rule* of the feudal, and later of the common law, that there must always be a tenant of the freehold, and that that must never be in abeyance. It was difficult for a long time, however, to get rid of the abeyance of the fee, that is, of the absolute ownership of the estate, distinguished from mere portions of it like a freehold life estate. But the recognition of the rule caused great embarrassments; for during the suspension of the fee there was no one to defend the title, or take any of those remedies in respect to the property which depended on the absolute ownership. The doctrine, therefore, came to be regarded with more and more disfavor, and its inconveniences inspired from time to time some of the most important reforms of the law. Blackstone says in one of his arguments, that the famous rule in Shelley's case owed its origin and adoption to the aversion of the common law to the suspension of estates through the operation of abeyance; and the same spirit of the law helped to break down the limitation or creation of remote and contingent remainders.

ABIAD, Bahr el. See NILE.

ABIATHAR, a Hebrew high priest, the son of Ahimelech, who was slain by Saul for receiving David when a fugitive. He was for a long time faithful to David, especially during Absalom's rebellion, when he accompanied the king. He afterward, however, took part in the rebellion of Adonijah, and was in consequence deprived of the priesthood and banished from the capital by Solomon.

ABIB (properly, *Hodesh haabib*, the month of the ears of corn), the first month of the Mosaic Hebrew year, corresponding nearly to our April. After the Babylonish captivity this month was called Nisan, month of blossoms or flowers. (See NISAN.)

ABICH, Wilhelm Hermann, a German-Russian naturalist, born in Berlin, Dec. 11, 1806. He graduated in 1831 at the university of Berlin, visited Italy and Sicily, and published *Erläuternde Abbildungen von geologischen Erscheinungen, beobachtet am Vesuv und Aetna* 1833 *und* 1834 (Berlin, 1837), and *Ueber die Natur und den Zusammenhang der vulkanischen Bildungen* (Brunswick, 1841). In 1842 he became professor of mineralogy in the university of Dorpat, and in 1853 a member of the St. Petersburg academy of sciences. He has explored the mountain ranges of the Caucasus, Russian Armenia, northern Persia, and Daghestan, and published in the German and French languages many works relating to the palæontology, geology, &c., of those regions, besides his contributions to the bulletins and memoirs of the St. Petersburg academy since 1848.

ABIMELECH. I. A Philistine king of Gerar, into whose dominions Abraham removed after the destruction of Sodom. The latter, from motives of prudence, pretended that Sarah, his wife, was his sister, whereupon Abimelech took her from him, intending to make her his concubine. By divine command, however, he restored her, rebuking Abraham for his fraud. Another Philistine king of Gerar of the same name was similarly deceived by Isaac in regard to Rebekah, and also rebuked him. **II.** A son of Gideon by a Shechemite concubine, who made himself king after murdering all his 70 brethren except Jotham, and was killed after a reign of three years while besieging the tower of Thebez. (See HEBREWS.)

ABINGER, James, Lord, an English lawyer, born in Jamaica about 1769, died in London, April 7, 1844. He is better known and remembered as Sir James Scarlett. He was a member of parliament for Peterborough from 1818 to 1830, afterward for Maldon, Cockermouth, and Norwich. He was at first a moderate whig, but gradually became a stanch tory. As an advocate he was one of the most popular men of his day, and his practice was immensely lucrative. His oratorical powers were of the most persuasive character; his speech usually assumed almost a conversational tone with the jury, and he had the art of appearing to address himself to each of his auditors individually. He was attorney-general from April, 1827, to January, 1828, and again from May, 1829, to November, 1830. In December, 1834, he was appointed lord chief baron of the exchequer, and on Jan. 12, 1835, he was raised to the peerage as Baron Abinger.

ABINGTON, Frances, an English actress, born about 1731, died in London, March 4, 1815. Her father was a common soldier named Barton. She was employed as a child in running errands, and afterward as a flower girl. Her first appearance as an actress was on the boards of the Haymarket in the character of Miranda in "The Busybody," 1755. She had previously married Mr. Abington, her music master, from whom she separated in a few months. At Dublin she was a great favorite, and when Garrick in 1765 invited her to London, she soon became the first comic actress of the day. She bade adieu to the stage April 12, 1799, and left at her death a legacy to each of the theatrical funds.

ABIPONES, a tribe of South American Indians who inhabited the district of Chaco in Paraguay, but now occupy the territory lying between Santa Fé and St. Jago, east of the Paraná river. Our accounts of this singular people are mainly derived from Dobrizhoffer, who lived among them seven years at the end of the last century. His volumes were translated from the Latin by Miss Coleridge (3 vols. 8vo, 1822). The whole tribe at that time did not number above 5,000. They practise tattooing. The men are of tall stature, good swimmers, and expert horsemen. The women practise infanticide to a great extent, but suckle those infants they permit to live for the space of two years. In counting they can go no further than three. See A. d'Orbigny, *L'Homme Américain*, vol. ii.

ABJURATION, Oath of, usually, an oath by which one renounces allegiance. But anciently in England, and before 21 James I., ch. 28, § 17, one who had been guilty of a felony, and who had fled for safety to the sanctuary of a church or churchyard, might upon confession of his crime take an oath before a coroner that he would abandon or renounce the country for ever, and thereupon he was permitted to leave it in safety. The statute just named took away the privilege of sanctuary, and with it this privilege of abjuration. Formerly too, in England—for example, under the statute of 35 Elizabeth, ch. 1—any person above the age of 16 years who refused to hear divine service or incited others to abstain from attending it, and by speech or in writing denied her majesty's authority in causes ecclesiastical, was required to conform and make submission to the church, or else to abjure the realm forthwith and for ever, before the justices at the assizes or in sessions.—The oath of abjuration in respect to the sovereign came into use in England after the restoration, and was changed from time to time until in the 6 George III. it took the form which it retained till 1858. All clergymen and public officers were required to take it on coming to their places, together with the separate oaths of allegiance and supremacy. The statute of 21 and 22 Victoria, ch. 48 (1858), displaced these three oaths by a single one which embraced the elements of all of them. It ended with the words, "and I make this declaration on the true faith of a Christian." In ordinary cases Jews had been excused from adding these words, but until 1858 no statute authorized their omission from the parliamentary oath; so that when in 1850 Baron de Rothschild, and in 1851 Mr. Salomons, had come into the house and refused to take the oath in its full form, they were declared incapable of sitting as members. The statute of 21 and 22 Victoria, ch. 49, however, authorized the houses to dispense with the obnoxious words in the case of Jews, and this authority was thereupon exercised in favor of Baron de Rothschild; and in 1860 a standing order on the subject was made to avoid the inconvenience of special resolutions in separate instances. But the statute of 29 and 30 Victoria, ch. 19 (1866), removed all difficulty by dropping the embarrassing clause altogether from the parliamentary oath.—Under the United States statute relating to naturalization, the subject of a foreign state who seeks to become an American citizen is required to declare on oath or affirmation, before the court to which he applies, that he absolutely and for ever renounces and abjures all allegiance and fidelity to every foreign power, authority, or sovereignty whatever, and particularly, and by name, to the foreign prince or potentate, state, or sovereignty of which he has been hitherto a subject.

ABKHASIA, or **Abchasia**, the country of the Abkhasians, a warlike tribe between the Black sea and the Caucasus, which has been conquered by the Russians. It is bounded N. and N. E. by the land of the Circassians, E. by Suanethi, S. E. by Mingrelia, and S. and W. by the Black sea. Its area, vaguely limited, is about 10,000 sq. m. Under the Roman emperor Justinian the Abkhasians became Christians, but subsequently they adopted Mohammedanism, to which religion they still nominally belong, though their religion in fact consists of a barbarous mixture of Christian, Moslem, and heathen notions and usages. The country was formerly divided into ten communities, the most important of which were Abkhasia proper (with 80,000 inhabitants), the Tziebelda (8,000), Samurzakan (9,800), and the country of the Jigets or Zadzes (10,000). Abkhasia proper has again had since 1771 an hereditary dynasty of its own, that of the Shervashidze, which since 1824 has been under Russian sovereignty. The residence of the prince is at Soyuk-Su (pop. about 5,000). On the coast the Russians have fortified several places, the most important of which is Sukhum Kaleh, or Baglata (pop. 3,000), supposed to be the site of the ancient Dioscurias, where according to Pliny 300 different tribes used to trade. About 15,000 Abkhasians have of late emigrated from Russia to Turkey.

ABLUTION, a religious ceremony in many portions of the world. In the Catholic church it means the cleansing of the cup after the Lord's supper, and is applied to the wine and water with which the priest who consecrates the host washes his hands.

ABNER, the son of Ner, cousin of Saul and the general of his troops. He was greatly loved by Saul, and faithful to him until his death, and then transferred his allegiance to Ishbosheth, Saul's son, to whom he preserved the throne of Israel for seven years against the rival claims of David. At length, Ishbosheth having accused him of improprieties with one of his father's concubines, he went over to the cause of David. But the aid he might have rendered to that king was cut off by his sudden death at the hand of Joab, David's captain, who was probably moved with jealousy at the influence of so powerful a rival for the king's favor, though Joab alleged that the object of the assassination was to avenge the death of his brother Asahel. David was, or, as intimated by Josephus, pretended to be, deeply afflicted at the death of Abner, and lamented him in a sort of funeral dirge.

ABO (Swed. *Åbo*), a city of Russia, in Finland, capital of the government of Abo-Björneborg, built on both sides of the Aurajoki, not far from where it flows into the gulf of Bothnia, 260 m. W. by N. of St. Petersburg; pop. in 1870, 21,830. It was founded in 1157 by the Swedes, and was the capital of Finland till 1819. A bishopric was established here in the 13th century. In 1827 the greater part of the city was destroyed by fire, including the university buildings and the library, containing 40,000 volumes. The university was rebuilt in Helsingfors, the new capital of the province. Abo is still the seat of considerable trade.—The peace of Abo, concluded Aug. 17, 1743, between Sweden and Russia, terminated the struggle between those countries commenced in 1741, at the instigation of France, in order to prevent Russia's participation in the war of the Austrian succession. During this contest, the blunders of the Swedish generals enabled the Russians to take possession of Finland. The empress Elizabeth offered to restore the greater part of the province, on condition that Sweden should elect Prince Adolphus Frederick of Holstein-Eutin successor to the throne. This demand Sweden complied with July 4, 1743.

ABO-BJÖRNEBORG, one of the governments of the grand duchy of Finland, situated on the Finnish and Bothnian gulfs; area, 9,869 sq. m.; pop. in 1867, 319,784, nearly all Lutherans. Capital, Abo.

ABOMEY, the capital of the kingdom of Dahomey, Africa, in lat. 7° 59′ N., lon. 1° 20′ E., 100 m. N. N. W. of Badagry; pop. about 50,000. It is about eight miles in circumference, surrounded by a ditch, and entered by six gates, all of which are ornamented with human skulls. It contains three royal palaces of two stories each. Within the palaces are barracks, in which the 5,000 Amazons of the king's army live in celibacy, guarded by eunuchs.

ABORIGINES. See American Indians.

ABORTION (Lat. *abortus*, a miscarriage), the premature expulsion of the fœtus or embryo, at so early a period that it is incapable of living, and the pregnancy is consequently unfruitful. In the human species, a child may often continue to live and be reared if born as early as the seventh month of pregnancy; and these accordingly are said to be cases of "premature birth." Nevertheless, if a child born after the seventh month and before the natural term of parturition should at once die in consequence of such premature birth, this would also be a case of abortion. In the earlier and middle periods of pregnancy, the death of the fœtus sometimes takes place from internal causes, and it is soon afterward discharged from the uterus, to which it has become a source of irritation. Thus, whether the fœtus die in consequence of premature delivery, or whether the premature delivery be a consequence of the death of the fœtus, all such cases are generally included under the term abortion. Abortion is sometimes produced, by various means, with the criminal intent of getting rid of the product of conception, and thus preventing the birth of a living child. All such means are dangerous to the mother, and may readily lead to a fatal result. The production of abortion for this purpose is therefore doubly criminal, since its first object is the destruction of the life of the fœtus or child; and this object is furthermore accomplished at the risk of death to the mother.—The legal and medical sciences are not quite in accord upon the matter. The increasing frequency of this practice of abortion in the most enlightened communities at the present day has attracted to it the particular attention of physicians; and they urge that the evil cannot be suppressed without the enactment of laws not only more severe but of a different character from those which have hitherto existed. They insist that, as the first and most essential step in the course of a reform of the law, the legislature must not only abandon the old idea that the quickening of the child is the commencement of its life, but must proceed directly upon the fact, especially emphasized by modern medical science, that the life of the future human being begins at the very instant of conception; that not only therefore must the old criteria of criminality which depended upon quickening be abandoned, but the protection of the fœtal life must be the direct object of the law, no less than the protection of the life or well-being of the mother, or the general conservation of public morality and decency. It will be seen on an examination of the later statutes that a substantial advance toward these positions has been made by legislation during the last 20 years.—For the purpose of an intelligent view of the existing law, and in anticipation of still further legislation, some facts upon the physical side of the subject may be well kept in mind. The fœtus cannot be properly regarded at any period of its existence as merely *pars viscerum matris*, as the phrase is; that is to say, as an essential constituent part of the mother. The ovum does not originate in the uterus, but after impregnation is lodged there, being totally disconnected from the organism of the mother during the transition; and it is attached to the uterus for the simple purposes of shelter and nutrition. The human form is developed and is visible in the fœtus even before the period of its quickening. This term quickening is the name given to those phenomena of different sorts by which action in the fœtus is manifested to the mother.

This mere incident of progressive development appears at no absolutely certain time, but usually between the 115th and 130th days after conception. Viability of the fœtus does not depend necessarily on its age, though it is usually not viable, or capable of living, before the lapse of seven months after conception; yet it may be at undeterminable periods before that time.—Though the legal offences relating to abortion depend almost entirely upon positive statutes, yet it is sometimes material to determine whether an act of this character is criminal at common law, as the phrase is; or, in other words, by the general, customary, and unwritten law. It is said by some of the best writers that there can be no doubt that at common law the wrongful destruction of an unborn child was a high misdemeanor, and that at an early period in England it was deemed murder. There are no reported cases confirming this view, but two passages of Bracton and Fleta ought not to be overlooked. Though they are in some respects of obscure meaning, yet they are noteworthy, not only as being the earliest declarations on the subject contained in English law books, but because the rules they lay down are so far advanced beyond those of the English law even of to-day. Both books were written in Latin, the former in the reign of Henry III. (1216–1272), the latter in that of Edward I. (1272–1307). Bracton says: "If any one shall have given blows or drugs to a pregnant woman, in consequence of which she shall have aborted, if the child were already formed and animate, and especially if animate, he is guilty of homicide." The author of Fleta says: "Whoever shall have done violence to a pregnant woman, or shall have given her drugs or blows so as to produce an abortion, or to prevent conception (*ut non concipiat*), if the fœtus was already formed and animate, is a homicide; and likewise, whoever shall have given or taken drugs with the intent to prevent generation or conception (*conceptio*). So, too, the woman is guilty of a homicide who has destroyed her animate child in her womb, by potions or things of that sort." These passages, it will be noticed, pronounce the mother's destruction of her unborn quick child a homicide. The present law of England declares that any woman being with child, and whether quick or not is indifferent, who uses drugs or any other means to procure her miscarriage, is guilty of a felony, and is punishable by imprisonment only. Coke, who lived in the 16th century, says in his third Institute that "if a woman be quick with child, and by a potion or otherwise killeth it in her womb, or if a man beat her whereby the child dieth in her body and she is delivered of a dead child, this is a great misprision and no murder." In this passage occurs the reference to the quickening of the child, which has always down to a very recent period been made an essential element in the degree of criminality in English acts relating to abortion. With reference to the common law on the subject, it has been held in Massachusetts, Maine, and New Jersey, that it is not, apart from statutes, an indictable offence to use means upon a pregnant woman, with her consent, for the purpose and with the effect of procuring an abortion, unless the mother were quick with child. It is not to be understood, however, from this that very grave and even capital offences may not be involved in such an act as that referred to even at common law; for in such a case, as Chief Justice Shaw remarked, if the woman's death ensued, the party making the attempt would be guilty of murder, and this whether the woman consented or not; for the act is done without lawful purpose, is dangerous to life, and the consent of the woman no more annuls the legal imputation of malice than it does in the case of a duel. And furthermore, as to the child produced by a criminal abortion, if it fairly live after birth and then die from injuries received in the body of the mother before its birth, it is clearly a case of homicide. In Pennsylvania the courts dissent from the view as to the common law which is taken in the states first mentioned. It was there declared that miscarriage, both in law and in physiology, means the bringing forth of the fœtus before it is perfectly formed and capable of living, and that it was of itself a flagrant crime at common law to attempt to procure the miscarriage or abortion of a woman; that it was a crime against nature which obstructed the fountain of life, and therefore it was punishable. To the objection on the part of the prisoner that the indictment was defective, because it ought to and did not allege that the woman was quick with child, it was answered by the court that that was not the law in Pennsylvania, and ought not to have been anywhere; that it was not the murder of a living child which constituted the offence, but the destruction of gestation by wicked means and against nature; and that the moment the womb is instinct with embryo life and gestation has begun, the crime may be committed.—But practically the actual law on the subject exists only in the statutes. The principal English acts of modern times are those of 43 George III., ch. 58, § 2; 9 George IV., ch. 31, § 14; 7 William IV.; and 1 Victoria, ch. 85, § 6; all of which are displaced by the present law of 24 and 25 Victoria, ch. 100, §§ 58, 59. The first of these acts, known as Lord Ellenborough's act, provided that any person who should wilfully, maliciously, and unlawfully use means . . . with intent to cause and procure the miscarriage of any woman being quick with child was a felon, and should suffer death; and the act further provided that in any such case, if the woman was not found to be quick with child at the time of the commission of the act, the offender should be guilty of a felony and liable to fine, imprisonment, pillory, transportation, &c. The statute of 9 George IV., ch. 31, known as Lord

Lansdowne's act, did not differ substantially from the former, but further provided against the use of instruments. The next statute provided that whosoever, with intent to procure the miscarriage of any woman, should use unlawful means, &c., should be guilty of felony and liable to transportation for life or not less than 15 years. The present statute provides that every woman being with child who, with intent to procure her own miscarriage, shall unlawfully administer to herself drugs, or use instruments, and whosoever with similar intent, whether the woman be or be not with child, shall use the like unlawful means, shall be guilty of felony, and liable on conviction to penal servitude for life or not less than three years, or to imprisonment. Supplying or procuring anything knowing that it is to be used with intent to procure the miscarriage of any woman, whether she be or be not with child, is a misdemeanor.—Of the more recent statutes in the United States, that of Maine (revision of *1871)* provides that whoever administers, &c., *to* any woman pregnant with child, whether such child be quick or not, &c., if the act is done with intent to destroy the child, and the child is destroyed before birth, shall be punished by imprisonment not more than five years or by fine not exceeding $1,000; and if done with intent to produce the miscarriage of such woman, by imprisonment not more than one year and by fine of not more than $1,000. The statute of Illinois of 1869 enacts that any person who by any means shall cause any pregnant woman to miscarry, or shall attempt to procure or produce such miscarriage, shall be liable to imprisonment not less than two nor more than ten years; and if by any such attempt the death of the woman shall be caused, the party offending shall be guilty of murder, and be punished as the law requires for that offence. But this crime may be committed, as has already been shown by the opinion of Chief Justice Shaw, independently of any statutory provision to that effect. In Missouri (revision of 1870) the wilful killing of an unborn quick child by any injury to the mother which would be murder if it resulted in the death of the mother, is manslaughter in the first degree; and every person who shall use means, &c., on a woman pregnant with a quick child, with intent thereby to destroy such child, unless the act is necessary to preserve life, &c., shall, if the death of such child or mother ensue from the means so employed, be guilty of manslaughter in the second degree; and every person who shall wilfully administer to or use means on any pregnant woman with intent thereby to procure an abortion, unless necessary to save life, or advised by physicians to be so necessary, is guilty of a misdemeanor, and is punishable by imprisonment for one year or by fine of $500, or by both. In Pennsylvania the statute (1860) provides that if any person shall unlawfully use means on any woman pregnant or quick with child, or supposed to be so, with intent to procure the miscarriage of the woman, and she, or any child of which she may be quick, shall die in consequence of such unlawful acts, the offender is guilty of a felony, and is liable to fine not exceeding $500 or to be imprisoned not exceeding seven years; and it is further provided that if any person, with intent to procure the miscarriage of any woman, shall use unlawful means upon her, he shall also be guilty of felony and subject to a fine not exceeding $500 and to imprisonment for not more than three years. The latest statutes—for example, those of New Jersey, Illinois (1869), Kansas (1868), and New York (1869)—do not require that the woman be quick with child, but only that she be "pregnant" or "with child." The Ohio statute of 1867 is to the same effect, but differs in its phraseology from the statutes of any of the other States. It provides that any person who shall administer or advise to be administered to any woman pregnant with a vitalized embryo or fœtus, at any stage of utero-gestation, any medicine or substance, or employ any other means, with intent thereby to destroy such vitalized embryo or fœtus, unless necessary or advised by physicians to be necessary to save the life of the mother, shall, in case of the death of such embryo or fœtus or mother in consequence thereof, be guilty of a high misdemeanor, and punishable by imprisonment from one to seven years. In Massachusetts, by the present statute, the offender is guilty of felony if the mother die in consequence of the act, and is liable to imprisonment from five to twenty years; and if she does not die, is guilty of a misdemeanor and punishable by fine and imprisonment not more than seven years. The present statute of New York was enacted in 1869, superseding that of 1846. This earlier act declared that every person who should administer to any woman pregnant with a quick child any drug, or use any instrument or other means, with intent thereby to destroy such child, should in case of the death of such child or of such mother be guilty of manslaughter in the second degree. The act of 1869 omits the word "quick," saying "with child," and with regard to the intent substitutes the words "with intent thereby to produce the miscarriage of any such woman;" and it preserves the provision that in case the death of such child or of such woman be thereby produced, the offender shall be guilty of manslaughter in the second degree. It will be observed that the omission of any criterion of quickening, and the provision respecting the death of the child, make the crime possible from the very earliest stage of gestation. Under the former statutes it was also an essential element of the crime that there should be an intent to destroy the child; now that intent is immaterial, and if there was the mere intent to procure the miscarriage, and the death of the child is produced, the crime is committed. The statutes here selected represent fairly the present state of the statutory law, and especially the more recent legislation on the topic.—In a late case in Massachusetts the court was inclined to hold that an indictment could not be maintained there if the fœtus had lost its vitality at the time of the commission of the act, so that it could never mature into a living child. In a similar case in Vermont it was held not essential that the fœtus should be alive when the attempt was made. Where the language is general, as for example, "with intent to procure the miscarriage of any woman," it is immaterial whether the woman was or was not pregnant at the time. The "administering" or "causing to be taken," usually mentioned in the statutes, does not require an actual delivery by the hand of the defendant. Thus it has been held that one administered poison to another by mixing it in her coffee and putting it in her way. And these words have been held to be answered by proof that one gave the drug to the woman with directions how to use it, and she did use it, though not in the defendant's presence. In New Jersey, under a statute which provided that if any person maliciously or without lawful justification, with intent to cause the miscarriage of a pregnant woman, should advise or direct her to take any drug, it was held that the actual taking or swallowing of the drug by the woman was no element of the crime; the defendant was guilty within the statute if only he gave the advice with the intent there declared. In this case the court added that the design of the statute was not to prevent the procuring of abortions so much as to guard the health and life of the mother against the consequences of such attempts. The word "malicious" in these statutes does not require proof of cruelty or wantonness or revenge. It is enough that there is no legal justification; and there is no such justification in the consent of the woman, nor though the real motive was to screen one or both of the parties from public exposure and disgrace. The patient in cases of abortion is not technically an accomplice in the offence so as to be disqualified from testifying; but as she is in almost all cases, by virtue of her consent, implicated in the moral wrong, this circumstance would fairly affect her credibility. Where the statute simply requires, as in Massachusetts, that the act shall have been done "unlawfully," the indictment need not charge that it was malicious and without lawful justification; and the word unlawfully precludes any possibility of inference that the act was done for the purpose of saving the life of the woman, or under any other circumstance which would afford a legal justification. The present statute of Ohio (1867) makes it a misdemeanor to print or publish advertisements of drugs for the exclusive use of women, or of any means for preventing conception or producing miscarriage, or to keep any such articles for sale or gratuitous distribution. A similar statute was passed in New York in 1869, and in Pennsylvania in 1870.

ABOUKIR, an Egyptian port about 12 m. N. E. of Alexandria. In the bay of Aboukir was fought, Aug. 1, 1798, the famous battle of the Nile or of Aboukir, between the French fleet sent out from Toulon under Brueys with Bonaparte and an army on board, and the English fleet sent in pursuit under Admiral Nelson. Though the French fought desperately, the engagement, which was begun at dusk, ended at daybreak in a great victory for the English. Only four French vessels escaped; the French lost more than 5,000 men; the English killed and wounded were but 895. Nelson was slightly, Brueys mortally wounded. The story of the battle is filled with examples of individual bravery on both sides.—At Aboukir, on July 23, 1799, Bonaparte, with a comparatively small force, almost annihilated the Turkish army under Mustapha Pasha.

ABOUT, Edmond, a French author, born at Dieuze, Meurthe, Feb. 14, 1828. He was educated at Paris, and in the French school at Athens. His literary talents had already become noted when in 1855 he published *La Grèce contemporaine*, which made him celebrated both at home and abroad. He next produced in the *Revue des Deux-Mondes* a novel entitled *Tolla*, which became the occasion of a controversy, in which he was accused of publishing private papers. After this he brought out novels and plays very rapidly, and contributed much to the press. His *Roi des montagnes* (1856) increased his reputation as a witty, pungent writer. Though not generally successful as a playwright, he made a hit by his play entitled *Risette, ou les millions de la mansarde* (afterward called *Gaetana*), in which sharp political and religious allusions abound. His most popular novels are *Germaine* (1857) and *Madelon* (1863). He has also published *Rome contemporaine* (1863), *Le Progrès* (1864), *L'Assurance* (1866), *L'A B C du travailleur* (1868), and *Le Fellah* (1870). As a contributor to the *Gaulois* newspaper (1867–'70) he criticised the ministers of Napoleon III., while he paid court to the emperor himself, who made him an officer of the legion of honor in 1867, and in February, 1870, appointed him member of the council of state. On the outbreak of the war in July, 1870, he accompanied MacMahon's army to Alsace, as correspondent of the *Soir* newspaper; but after the battle of Wörth he barely escaped falling into the hands of the Germans. He continues (1872) his connection with the *Soir*. His marriage in 1864 with Mlle. de Guillerville, of Roncherolles, near Rouen, made him affluent.

ABRACADABRA, a magical word with the ancients, supposed to possess some talismanic properties when inscribed and partially repeated in a triangular form, so as to be read in different directions, upon a square piece of paper or linen, folded and worn as an amulet or variously used in incantations.

ABRAHAM (originally Abram), the first patriarch of the Hebrews. See Hebrews.

ABRAHAM À SANCTA CLARA, a German preacher, whose proper name was Ulrich von Megerle, born at Krähenheimstetten in Swabia in 1642, died in Vienna, Dec. 1, 1709. He was an Augustinian monk, and preached such witty and powerful sermons that the German emperor appointed him court chaplain. He wrote "Hotch Potch," "Judas the Arch Knave," "Fie and Shame on the World," &c.

ABRANTES, a town in Portuguese Estremadura, at the head of navigation on the Tagus, 80 m. N. E. of Lisbon; pop. in 1863, 5,590. It is surrounded by a very fertile and highly cultivated plain, dotted with villages and villas, but is chiefly important as a military position, commanding one of the frontier roads from Spain into Portugal.

ABRANTÈS. I. Andoche Junot, duke of, a French soldier, born at Bussy-le-Grand, Burgundy, Oct. 23, 1771, died in Montbard, July 29, 1813. He was educated for the law, but in 1792 enlisted in the army as a volunteer, and by his courage won the sobriquet of "the Tempest." He attracted Bonaparte's attention at the siege of Toulon, and a close intimacy sprang up between the two, Junot's devotion to his superior amounting almost to fanaticism. He accompanied Bonaparte to Italy as his aide-de-camp, and won the rank of colonel in the campaign of 1797. He distinguished himself in Egypt, and was made brigadier general. A wound received in a duel with a brother officer, who was not as enthusiastic a Bonapartist as himself, delayed his return to France, and he landed at Marseilles on the day of the battle of Marengo. He was forthwith appointed to the command of Paris, and a few months later married Mlle. Laure de Permon, and was made general of division. But his own as well as his wife's indiscretions were so distasteful to Napoleon, that in 1803 he removed Junot to the command of one of the corps of the "army of England." On the establishment of the empire Junot was promoted to the rank of colonel-general of the hussars, received a pension of 30,000 francs, and a little later the grand cross of the legion of honor; but he could not conceal his disappointment at not having been placed among the first marshals of the empire. His dissatisfaction, his improper behavior and lavish expenditures, coupled with his wife's eccentricities, caused the emperor to send them for a while into honorable exile; and Junot was in 1805 appointed ambassador to Lisbon, where he distinguished himself only by ostentation. In the same year he went to Germany without permission, and arrived in time to participate in the battle of Austerlitz. In 1806 he was again appointed governor of Paris and commander of the first military division; but his follies again compromised him, and in 1807 he was sent to Spain to take command of the army that was to invade Portugal. At the head of 25,000 men, hastily collected and ill provided, he marched from Salamanca Nov. 12; reached the frontier at Alcántara amid extreme privation and suffering; gained the town of Abrantes, whence his title of duke, Nov. 23; and, without pausing a moment, seized Lisbon (Dec. 1), at the head of only 1,500 grenadiers, most of whom were so worn out that they seemed to be only walking skeletons. Displaying enormous activity, he got possession of the principal fortresses of the kingdom, and reorganized and strengthened his exhausted forces; but his success was soon checked by the arrival of Sir Arthur Wellesley with an English army. Junot was defeated at Vimeiro, and constrained by the convention of Cintra, Aug. 22, 1808, to evacuate Portugal. Landed at La Rochelle with his troops by the English fleet, he immediately joined Napoleon, who took him back to Spain, where he was placed in command of the third corps, then besieging Saragossa. He participated in the campaign of 1809 in Germany, and in 1810 was sent back to Spain, where he was severely wounded in the face by a bullet. In 1812 he commanded a corps of the invading army in Russia; but his slow operations did not satisfy the emperor, who, instead of employing him actively the next year in Saxony, appointed him commander of Venice and governor general of the Illyrian provinces. This kind of disgrace, combined with other troubles and the suffering from his old wounds, preyed so much upon him that he became insane, and was taken to his father's house at Montbard, where he threw himself from a window and died from the effects of the fall. **II. Laure Permon Junot,** duchess of, wife of the preceding, born in Montpellier, Nov. 6, 1784, died at Chaillot, near Paris, June 7, 1838. Her mother, a Corsican, claimed descent from the Comnenus family. Her father, M. Permon, made a fortune by provisioning Rochambeau's American troops, but lost it before his death (October, 1793). The mother lived in good style at Paris, and her house was frequented by Bonaparte, Junot, and other distinguished persons. Bonaparte, according to her daughter's *Mémoires*, wished to marry her, though she was old enough to be his mother. Mlle. Permon became the wife of Junot in 1800, the first consul giving her rich presents, both then and many times afterward. This munificence encouraged Mme. Junot in a course of extravagance which, as well as her other indiscretions, eventually proved disastrous to her fortunes. Napoleon's friendship for her was also said to have excited the jealousy of Josephine, while her excessive love of finery and her sharp tongue made him call her *petite peste*. While in Madrid and Lisbon with her husband, her lavish expenditure and her regal pretensions caused astonishment. At Neuilly she hired a palace known as the Folie St. James, where she performed in private theatricals, in which she excelled. Even while following her husband in the Spanish campaign, she kept up her Parisian style of entertainments in the various encampments of the army. At the same time she bore all the fatigues of the war with great fortitude. While at Lyons she paid a visit to Mme. Récamier, and, courting the society of other persons who were not liked by Napoleon, she incurred his displeasure, and was not permitted to reside in Paris. Her husband, too, having forfeited the good will of the emperor, was banished from Paris, though he was in a dying condition; and the duchess, while attempting to see him at Montbard, where he died, was taken ill. In spite of Napoleon's orders she went to Paris in September, 1813, and her house became once more the centre of distinguished persons, especially after the restoration of the Bourbons, toward which she had contributed. In 1817 she took up her residence at Rome. Having sold the magnificent library and the other valuable legacies of her husband, and being at the end of her resources, she entered into a contract for the publication of her writings. At the time of the July revolution, 1830, she lived in retirement at the Abbaye-aux-Bois, near Paris, and in 1831 began the publication of the *Mémoires ou Souvenirs historiques sur Napoléon, la Révolution, le Directoire, le Consulat, l'Empire et la Restauration* (18 vols. 18mo, Paris, 1831–'34). She also wrote memoirs of her experience in France, Spain, and Portugal, and many novels and stories, besides contributing to periodicals; but her literary fame rests chiefly on her brilliant gossip and overflowing anecdotes relating to the court of Napoleon. Notwithstanding her incessant literary activity, she remained very poor, and died at Chaillot two days after her removal to a private hospital in that place. Louis Philippe sent some money for her relief, but she died before it reached her. Ignazio Cantù published in 1837 *Relazione della duchessa d'Abrantès*, and A. D. Roosmalen in 1838 *Les derniers moments de la duchesse d'Abrantès*. **III. Napoléon Andoche Junot,** duke of, son of the preceding, born in Paris in 1807, died there in March, 1851. Obliged to leave the diplomatic service on account of his scandalous private life, he became known in light literature by a variety of works of ephemeral reputation, the principal among them being *Les boudoirs de Paris* (6 vols. 8vo, Paris, 1844–'5). **IV. Adolphe Alfred Michel Junot,** duke of, brother and heir of the preceding, born at Ciudad Rodrigo, Spain, Nov. 25, 1810, died in July, 1859. He was aide-de-camp of Gen. MacMahon in Algeria (1848), and of Prince Napoleon in the Crimea (1854), served with a high rank in the Italian war, and died from a wound received at the battle of Solferino. **V. Joséphine Junot d',** sister of the preceding, born in Paris, Jan. 5, 1802, married in 1841 M. James Amet, after having been previously a sister of charity and canoness. She is the author of a number of stories and novels published under her maiden name. The best known of them are: *Histoires morales et édifiantes* (1837); *La duchesse de Valombray* (2 vols., 1838); and *Étienne Saulnier* (2 vols., 1850). **VI. Constance Junot d',** sister of the preceding, born in Paris, May 12, 1803, is the wife of M. Louis Aubert, for some time editor of the *National* newspaper, and in 1848 prefect in Corsica. Under the name of Constance Aubert she has been connected with periodical literature as a writer on fashions, manners, and customs. In 1859 she published a *Manuel d'économie élégante*, and in 1865 a little volume on the luxury of women (*Encore le luxe des femmes: Les femmes sages et les femmes folles*).

ABRAVANEL, Abrabanel, or **Abarbanel, Isaac ben Judah,** a Jewish author, born in Lisbon in 1437, died in Venice in 1508. His family boasted a lineal descent from the kings of Judah. He received an excellent education, and was equally successful in the pursuit of knowledge, wealth, and influence. Alfonso V. of Portugal employed him in state affairs; but his son and successor, John II., not only withdrew all favor from him, but, unjustly suspecting him of intrigues with Spain, caused him to fly to that country, and confiscated his property. He sought consolation in study, but after a time entered the service of King Ferdinand of Aragon. The expulsion of the Jews from Spain, decreed in 1492 by Ferdinand and Isabella, again made him an exile. Repairing to Naples, he was well received by Ferdinand I., and by his son Alfonso II.; but the invasion of the French in 1495 drove him with the Neapolitan court to Messina, whence he repaired to Corfu. In 1496 he established himself at Monopoli in Apulia, where he remained till 1503. The last years of his life he spent in Venice, where he once more engaged in state affairs. His works, the principal of which are commentaries on various books of the Scriptures, partly of a critical and partly of a doctrinal character, and a number of philosophical treatises, are marked by a glowing enthusiasm for Judaism, a comparative independence of spirit, vast research, and elegant Hebrew diction. One of his three sons, Leone (originally Judah) was the author of a philosophical work in Italian, entitled *Dialoghi di Amore*, which passed through several editions.

ABRAXAS (Gr. *αβραξας* or *αβρασαξ*), a mystical word employed by the Egyptian Gnostic Basilides to signify the Supreme Being as ruler of the 365 heavens of his system, which number is represented by its letters according to Greek numeration; probably in imitation of the significance attached to the name of the Persian god Mithras (Μειθρας), the letters of which have the same numerical value. Some authorities, however, give the word other derivations and different significations as a designation of the Supreme Being.—Many ancient stones or metallic tablets called Abraxas gems or images, or Basilidian stones, have been found, chiefly in Egypt, Syria, and Spain. They are generally inscribed with the word Abraxas or Abrasax, and sometimes with others, and bear a great variety of Gnostic and other mystical symbols, occasionally perhaps merely natural markings. They were used as amulets, and supposed to be endued with miraculous qualities.

ABRUZZO, or the Abruzzi, the northernmost division of the former kingdom of the Two Sicilies, now forming part of the kingdom of Italy, embracing the highest and wildest portion of the Apennines. The mountains are the home of a race of shepherds, who are clothed primitively in untanned sheepskins, and the valleys and lowlands are very fertile. The inhabitants live in dirty huts, shared by the donkey and the pig; their chief food is Indian meal, boiled in water and milk; wheaten bread is a luxury. They are musical, hospitable, superstitious, and revengeful. Physically they are a fine race of men, and make excellent soldiers, like their predecessors in Roman times, the Samnites. Fierce brigandage has long found an almost impregnable foothold in this wild region. It is divided into the following three provinces: **I. Abruzzo Citeriore**, bounded N. E. by the Adriatic; area, 1,105 sq. m.; pop. in 1871, 339,961. The mountains of La Majella are the roughest part of the province. The chief productions are grain, oil, and rice. The greatest abundance of wine is furnished by Ortona; the best by Chieti and Vasto. Fruit and kitchen vegetables are chiefly grown at Chieti; swine are reared in the oak forests, and the sea on the coast is rich in fish. The culture of silkworms and of mulberry trees has of late made great progress. The province is divided into the districts of Chieti, Lanciano, and Vasto. Capital, Chieti. **II. Abruzzo Ulteriore I.**, bounded S. by the preceding, and also lying on the Adriatic; area, 1,283 sq. m.; pop. 245,617. The Pizzo di Sevo, 7,860 feet high, is the chief summit. The province grows and exports a large quantity of grain. There are numerous plantations of olives, but the product is of an inferior quality. The culture of wine is rapidly increasing. The province is divided into the districts of Teramo and Penne. Capital, Teramo. **III. Abruzzo Ulteriore II.**, bounded N. E. by the two preceding, N. by Umbria, and S. W. partly by the former Papal States; area, 2,126 sq. m.; pop. 333,791. Three fourths of the area consists of sterile rocks and mountains. The number of large mountain peaks is no less than 176. In the middle of the northern frontier is the highest mount of the peninsula, the Gran Sasso d'Italia, 9,392 feet high. Among the productions are grain, rice, wine, saffron, olives, and many kinds of fruits. The mountains are covered with extensive forests of oaks, beeches, and elms, which harbor bears, wolves, and boars. On the Gran Sasso chamois are still said to be found. Madder grows wild on the Alpine heights, and is cultivated in sandy places. Hams, salted beef, and sausages are exported. The province is divided into the districts of Aquila degli Abruzzi, Avezzano, Cittaducale, and Solmona. Capital, Aquila.

ABSALOM, the third son of David, his only one by Maachah, and especially distinguished for beauty. Instigated possibly by ambition, but ostensibly by the rape of his sister Tamar, he slew Amnon, his eldest half-brother, and subsequently raised a rebellion and obtained a momentary possession of the throne. By the adroit management of Joab he was overthrown and slain. With all his want of filial affection, David loved him, and mourned his death.

ABSALON, or Axel, a Danish statesman, soldier, and ecclesiastic, born in 1128, died in 1201. He was educated at the university of Paris. He was related to the royal family, and was the chief minister and general of Waldemar I. (1157–'82) and Canute VI.; was elected bishop of Roeskilde in 1158, and archbishop of Lund and primate of Scandinavia in 1178; and was equally distinguished for piety, statesmanship, and military skill and valor. He put down the Wendish pirates who infested the Baltic, followed them up to their island home of Rügen, destroyed the temple of their god Svantevit at Arkona, and forced them to receive Christianity. The code of Waldemar was partly his work, as also the ecclesiastical code of Seeland. On his encouragement, Saxo Grammaticus composed his history of Denmark, the first continuous Scandinavian history ever written. Later he overcame the Pomeranian prince Bogislas, and made him do homage to the Danish king. He constructed a little fort, named after him Axelhuus, for defence against pirates, around which Copenhagen was gradually reared.

ABSCESS (Lat. *abscedere*, to separate), a collection of pus in a circumscribed cavity of the body. This cavity is usually of new formation, produced by the separation and destruction of the parts by the matter effused, the wall consisting of a layer of thickened tissue. The name is given, however, to collections of pus in some of the naturally existing cavities; *e. g.*, that in the upper jaw. An abscess may be acute or chronic according to the character of the inflammation which produces it. The formation of an acute abscess is indicated by pain, often of a throbbing character; redness, if it be not too deeply seated; swelling; and an increase in the temperature of the part. The patient also suffers from fever. When matter has formed and is sufficiently near the surface, its presence is made known by the feeling of "fluctuation," produced by placing the fingers of one hand upon one side of the swelling and with those of the other giving a smart tap upon the opposite side. The pus usually tends toward the surface, which it reaches by a gradual thinning of the intervening tissues; but if these be very resisting, it may travel in other directions. It is in these latter cases that an early incision by the surgeon is especially called for, before "pointing" has taken place. —If an abscess be threatened, its formation may sometimes be prevented by appropriate treatment, such as rest, the local abstraction of blood, and cold or warm applications, as the case may demand. Should these means fail, poultices must be used to promote suppuration. The matter may be evacuated by incision, or in certain cases be allowed to make an exit for itself. In a chronic abscess the pain, redness, increased temperature, and fever are often absent, and hence it is also known as cold abscess. In most cases its progress is slow, and it may remain for a long time without increase in size, or any tendency to open through the skin. Indeed, in some instances it may disappear by a process of absorption. Usually, however, it is necessary to open it, which may be done by cutting directly into the cavity, or by what is known as subcutaneous incision, the knife being passed for some distance beneath the skin before it enters the abscess. This latter procedure is made use of in order to prevent the admission of air, which in some cases excites an amount of suppuration sufficient to exhaust the patient. Besides acute and chronic, abscesses are spoken of as being "by congestion" when the matter, usually dependent on caries, makes its appearance at some distance from the diseased part; as "idiopathic," when the cause is not known, &c.

ABSINTH, or **Wormwood,** the tops and leaves of *artemisia absinthium*, a plant of the order *compositæ* and tribe *senecionideæ*. It contains a volatile oil and a very bitter, resinous substance called absinthine. It has been used as an aromatic, bitter tonic, and anthelmintic. It derives its chief importance from being a constituent of the French liqueur called *absinthe*. This consists of alcohol holding in solution the active principles, mostly volatile oils, of several aromatic plants besides wormwood. The precipitation of these oils, when the liqueur is added to water, produces whitening or clouding. The continued use of absinthe has been found to give rise in man to symptoms of an epileptic character, not altogether attributable to the alcohol it contains. Experiments have shown that the essence of absinth, in a single large dose, may cause epileptiform convulsions in animals. The brain disease produced by this drug is considered incurable, though temporary respites may occur.

ABSOLON, John, an English painter, born in London, May 6, 1815. He is a member of the "New Water Color Society," to the annual exhibitions of which he is still a steady contributor. He paints history and genre with equal facility, and is known as an accomplished draughtsman and colorist. He has attempted oil painting with success, but his special field is water-color drawing.

ABSOLUTE (Lat. *absolutus*, absolved, freed from all extrinsic conditions, complete in itself, and dependent on no other cause), a term much used in modern philosophy, especially by Schelling, Hegel, Cousin, and their followers. As used by them it stands opposed to the relative, for independent, unconditioned, self-existent being, or being in itself, which they contend is the primitive in all thought, and the ultimate in all science, and the object of immediate intuition. In their language the absolute means, or is intended to mean, the Infinite, God himself, regarded simply as pure being, *Das reine Seyn*. Sir William Hamilton denies that absolute and infinite are identical, and that in the sense of the infinite—the unconditioned—the absolute is an object of intuition. He confines all philosophy, therefore, to the finite, the relative, the conditioned. To think, he says, is to condition, and there is no intuition without thought. The absolute and relative can be thought only as correlatives, each connoting the other, and, therefore, only as conditioned. He is answered by those who profess the philosophy of the absolute, that, although the term may be used to express an idea different from that of the unconditioned, or the infinite, and although to think is, in a certain sense, to condition, yet the condition is, in the thought itself, always apprehended as the condition of the subject, never as the condition of the object. Certainly the finite can apprehend the infinite only in a finite mode or manner, but to apprehend it even in a finite mode or manner is still to apprehend the infinite. It is not necessary to the reality of human knowledge that it should be adequate to the object, for if it were there could be no human knowledge at all. They reply further, that the relative is inconceivable without the absolute. What is not, is not intelligible; and since the relative is not and cannot be without the absolute, the conditioned without the unconditioned, there can be no intuition of the former without a simultaneous intuition of the latter, nor are they intuitively apprehended precisely as correlatives, each as conditioned by the other; for in the intuition itself the absolute is apprehended as the cause or creator of the relative, the unconditioned as conditioning the conditioned. There is another controversy even among those who are termed ontologists, and who profess to find in the intuition of unconditioned being the principle of philosophy—whether the pure being, the absolute, the unconditioned being, asserted by Cousin and the German school, and which they identify, or attempt to identify, with God, is real living being, real living God, or after all only a logical abstraction. A class of modern philosophers, among whom may be mentioned Vincenzo Gioberti as the most distinguished, maintain that, as the terms the absolute, the infinite, the unconditioned are evidently abstract terms, the idea they express is and can be only a logical abstraction, formed by the mind operating upon its own conception, and eliminating from them all conception of space, time, bounds, conditions, or relativity. In this case, they say, it is no real being, but a simple generalization of psychological phenomena, and as far removed from the *ens necessarium et reale*, the real and necessary being of the schoolmen, the real living God, in whom the human race believe, as zero is from being something. Hence, though for another reason, they refuse to concede with Sir William Hamilton that we have intuition of the absolute, the infinite, or the unconditioned, but assert, in opposition to him, that we have immediate intuition of that which in reality is absolute, infinite, and unconditioned. To suppose that we have intuition of being, or God as the absolute, would be to suppose that we know the abstract before the concrete, the possible before the real, and therefore that reflection or reasoning precedes instead of following intuition. They dissent, therefore, from Schelling, Hegel, and Cousin, and deny that we have immediate intuition of the absolute, that is of God, real and necessary being, as the absolute; and maintain that while we have immediate intuition of that which is absolute, infinite, unconditioned, we conceive the intuitive object as such only by a process of reflective reason—the process by which the human mind demonstrates that the object of its intuition is God.

ABSOLUTION, in the Roman Catholic church, the act of the priest in pronouncing the pardon and remission of the sins of a penitent. Absolution *in foro interno* is a part of the sacrament of penance, in which the guilt of mortal and venial sin is remitted. Absolution *in foro externo* is the remission of certain ecclesiastical penalties, for example, excommunication. There are also precatory forms of absolution, which are used during the divine service. Short prayers at the end of each nocturn in the office of matins are also called absolution. In the morning and evening prayers of the English and American Episcopal churches, absolution is a formula of publicly praying for or declaring the remission of the sins of the penitent, used only by a priest; also, in the "Office for the Visitation of the Sick" of the church of England, an authoritative declaration of the pardon of sin, pronounced over a penitent after private confession. Similar forms of absolution are used in the Lutheran church.

ABSORPTION (Lat. *absorbere*, to suck up). I. The process by which nutritious and other fluids are imbibed by animal and vegetable tissues, to be appropriated for their growth, activity, or modification. All the organized membranes and tissues of the living body have the property of absorbing, to a certain extent and under favorable circumstances, the fluids which are brought in contact with them. This property continues to belong to the tissues in question even after the death of the body, or after they have been separated from all connection with the neighboring parts, until their natural structure and composition have begun to be altered by the effects of decomposition. Thus a dried ox bladder will absorb water in which it is immersed, and again become moist and supple; and even microscopic cells and fibres will absorb coloring matters with which the vessels of the tissue have been injected. This shows that the power of absorption resides in the substance of the animal tissue or membrane itself, and not in any property communicated to it from the rest of the system. Nevertheless, although the capacity for absorption still exists in a separated membrane, it is much less active than in the same tissue during life, for the reason that after death it soon comes to an end by the saturation of the membrane by the absorbed fluid; while during life it is kept in a constant state of activity by the incessant renewal of the fluids and the movement of the circulating blood. In the process of absorption, as it takes place in animal organizations, the fluid does not penetrate the tissues mechanically, by openings or orifices, however minute. The existence of such orifices, or open absorbent mouths, was formerly taken for granted, as the most convenient way of explaining the phenomenon; but later and more complete microscopic examination has failed to show their existence, and takes away all reasonable grounds for the assumption. So far as we can decide upon a question of such delicacy, absorption consists in the imbibition of a fluid by the solid tissue in such a manner that the fluid and its ingredients unite, or combine directly with the substance of the tissue; so that the union which results is not simply a mechanical entanglement, but rather an intimate and complete molecular combination of the two.—It is found that different animal substances have the power of absorbing different liquids in different proportions. Thus an animal membrane which will absorb in a given time 100 parts by weight of pure water, will absorb only 65 parts of a saline solution; and this difference will be greater, within certain limits, the stronger the saline solution is made. A tissue which will absorb 100 parts of a saline solution will take up under the same circumstances only 24 parts of an oily liquid. Thus the activity of absorption varies with the same membrane for different liquids, and with the same liquid for different membranes. Chevreul found the following results by measuring the exact quantities of different liquids absorbed by different membranes and tissues in the same time:

100 PARTS OF		WATER.	SALINE SOLU'N.	OIL.
Cartilage........	absorb in 24 hours	231 parts.	125 parts.	
Tendon		178 "	114 "	8·6 parts.
Elastic ligament.		148 "	80 "	7·2 "
Cartilaginous do.		319 "		3·2 "
Cornea..........		461 "	370 "	9·1 "
Dried fibrine....		301 "	154 "	

Thus, if the same membrane be brought in contact with a liquid containing at the same time a variety of different substances in solution, some of these substances will be taken up in greater abundance than the others; and the membrane accordingly will appear to exercise a kind of discriminative power or selection between these different substances. This power of selection, however, is simply the property, dependent on the natural structure and constitution of the membrane, of absorbing particular substances in certain fixed proportions, which proportions vary for different materials. —The activity of absorption varies also with other conditions. One of these is the freshness of the animal membrane. While still connected with the neighboring parts, or but recently separated from them, the activity of absorption is great, and a comparatively large quantity of fluid is taken up in a short time. Afterward, when the natural constitution of the membrane is already impaired by commencing decomposition, this activity diminishes, and at last disappears altogether. Another condition of some importance is that of pressure. An increased pressure upon the liquid will enable the membrane to absorb it more rapidly. Pressure and motion combined are still more effective. Thus a medicinal ointment or lotion acts more rapidly and powerfully upon the parts if it be made to penetrate the integuments by brisk rubbing than if it be simply laid in contact with the surface of the skin. Temperature also is of considerable importance. A low temperature is unfavorable to absorption; a high temperature, at least within moderate limits, is favorable to it, and increases its activity. A state of complete liquefaction or solution of the material to be absorbed is essential. A substance which is in the solid form cannot be absorbed; it must first be dissolved either in water or some other appropriate menstruum, after which the solvent fluid and the substance dissolved may both be absorbed, though in different proportions. Even the gaseous ingredients of the atmosphere, which are absorbed in the lungs, are first dissolved in the animal fluids which bathe the respiratory passages, and are then absorbed in the liquid form by the pulmonary membrane. The last and most important condition of the continued activity of absorption is that by which the materials already absorbed by the animal membrane are constantly removed from it, so that it is always ready to take up a fresh supply. If an animal membrane have on one side of it a liquid rich in absorbable materials, and on the other a liquid which is poor in these materials or destitute of them, it will take up these substances from the first liquid, and the second liquid will again absorb them from it. Thus the membrane will not become saturated, but will retain its activity of absorption until the second liquid has approximated in composition to the first. In this way a large quantity of material may pass through the membrane, from the first to the second liquid, combining with the substance of the membrane in its passage, but being constantly taken up by it on one side and discharged on the other. This process will be more active and long continued, the larger the quantity of the two liquids and the greater the difference in composition between them. It will also be more active, the greater is the extent of surface over which the liquids reciprocally come in contact with the membrane, since it is the absorptive power of the membrane itself which is the primary condition of the interchange of substances between them. The most favorable condition for continued and active absorption would be that in which the two liquids were kept in constant motion and incessantly renewed, so that the first one should never be exhausted of its materials, nor the second saturated with the substances transmitted to it. If, at the same time, the intervening membrane maintained its freshness, unaltered by the changes of decomposition, the process of absorption would go on with the most continuous and uniform activity. These are precisely the conditions, in fact, which are present in the living body. In the alimentary canal, for instance, during digestion, there are constantly passing over the lining membrane of the intestine the nutritious fluids which have been extracted from the food. A portion of these are absorbed by the lining membrane; but, on the other hand, they are immediately taken up from it by the blood in its minute vessels. This blood, in the incessant movement of the circulation, is instantly carried away to another part of the body, its place being taken by other portions of the current following each other without intermission. The living membranes themselves are maintained at the same time in their natural condition by the nutritive process, the temperature of the whole is constantly at or about 100° F., the superfluous materials are decomposed elsewhere, or discharged from the body by the excretory passages, and new supplies are incessantly furnished as the gradual digestion of the food is accomplished.—Experiments have shown that absorption will take place in the living body with considerable rapidity even in non-vascular tissues, or where it is not directly assisted by the circulation of the blood. It has been shown by M. Gosselin that if a watery solution of iodide of potassium be dropped upon the cornea of a rabbit's eye, the iodine passes into the cornea, aqueous humor, iris, lens, sclerotic coat, and vitreous body, in the course of eleven minutes; that it will penetrate through the cornea into the aqueous humor in three minutes, and into the substance of the cornea in a minute and a half. In the vascular tissues, however, the rapidity of absorption is often much greater than this. Thus the absorption of oxygen by the blood in the lungs is apparently instantaneous; the change of its color from blue to red, as soon as it arrives in the pulmonary vessels, showing the action of the gas which it has taken up from the atmosphere. This rapidity of absorption in the vascular tissues is due to the dissemination of the blood in a vast number of minute channels, by which the vascular and absorbing surfaces are brought into intimate contact over a large surface; and to the incessant motion of the fluid, by which its effect becomes perceptible at the earliest possible time. It is in some of the glandular organs that this absorption and reciprocal interchange of fluids has been shown to take place with the greatest activity; for the capillary blood vessels here form an exceedingly intricate and abundant network embracing the adjacent follicles and ducts of the glandular tissue, while these ducts and follicles themselves are arranged in a system of minute ramifying tubes and cavities, penetrating everywhere through the glandular substance. Thus the union and interlacement of the glandular membrane on the one hand and of the blood vessels on the other becomes exceedingly extensive; and the ingredients of the blood are instantly subjected, over a very large surface, to the influence of the glandular membrane, or the fluids which it has absorbed. The rapidity of transudation under these conditions has been shown by the experiments of Claude Bernard and other observers. If a solution of iodide of potassium be injected into the duct of the parotid gland on one side, in a living animal, the saliva discharged by the corresponding gland on the opposite side is immediately afterward found to contain iodine. During the few instants required to perform this operation, therefore, the iodine in solution must have been taken up by the glandular membrane on one side, absorbed from it by the blood, carried by the blood to the heart, again distributed over the body, absorbed from the blood by the glandular membrane of the second gland, and thence discharged with the saliva. It is by this process that all the nutritious elements of the food and drink are taken up from the intestine and finally reach the tissues which they are to nourish. They are absorbed from the cavity of the intestine first by its lining membrane; thence by the blood vessels and the blood contained in them; then transported by the circulation to the distant organs and tissues; and finally absorbed by these tissues from the blood, and united with their own substance. But as each tissue has a special power of its own of absorbing certain materials in preference to others, the same blood will supply its materials to each in different quantities. Thus the bones absorb from the blood a large proportion of calcareous matter, the cartilages a smaller quantity, and the muscles still less. The brain, on the other hand, takes up more water than the muscles, and the muscles more than the bones. Thus every tissue is enabled to maintain its own peculiar constitution, though all are supplied with the necessary ingredients from the same nutritious fluid.—It is now universally acknowledged that the action of drugs, medicines, and poisons takes place in the same way. This action is sometimes said to be local, as where the ingredients of a blister are absorbed by the skin and produce an inflammation of the integument at that spot only; or general, as where opium when introduced into the stomach produces drowsiness or insensibility over the whole body. But in both cases the process is essentially similar. The opium is dissolved by the liquids of the stomach, absorbed by its lining membrane, taken up by the blood, and distributed by the circulation all over the body. In this way reaching the brain, it is absorbed by the cerebral substance, and by its action upon the nervous matter causes the narcotism and insensibility which are manifested throughout the system. Thus the general action of an opiate is undoubtedly due to its local action upon the brain, and to the fact that the brain itself, through the nervous ramifications, influences the condition of the whole body. **II. Absorption of Gases by Solids and Liquids.** There are not only porous substances, as earth, charcoal, and animal membranes, which will absorb gases, but solid metals will in many instances do the same. Thus recent experiments have demonstrated the existence of gaseous hydrogen in meteorites falling on the earth, absorbed by them in their wanderings through space, perhaps while passing through some nebula, which the spectroscope has shown to consist of incandescent hydrogen; they bring thence this nebular hydrogen to our earth. The power to absorb hydrogen is especially possessed in a high degree by palladium, which takes up nearly 643 times its own volume of this gas, as proved by Graham, while silver and platinum absorb oxygen, titanium nitrogen, &c. This absorption of gas by metals is called occlusion. Deville and Troost have proved the remarkable fact that red-hot iron and platinum have such a great capacity of absorbing hydrogen, that it passes through these metals as it were through a sieve. The absorption of gases by liquids is still more striking. Water absorbs different gases and holds them in solution, in quantities varying in proportion to the nature of the gas. Thus, at a temperature of a few degrees above the freezing point, it contains when exposed to the air 4 per cent. in volume of oxygen and 2 per cent. of nitrogen; so that the air contained in water is much richer in oxygen than our atmosphere, having in six parts four of oxygen, while the atmosphere contains only one part of oxygen in five of air. The solubility of hydrogen in water is equal to that of nitrogen; while in regard to other gases, one part of water in bulk dissolves under the same circumstances 1·3 parts of laughing gas, 1·8 carbonic acid, 3 of chlorine, 4·4 of sulphide of hydrogen, 54 of sulphurous acid, 505 of hydrochloric acid, and not less than 1,180 of ammonia. A rise of temperature of some 70° diminishes this power of absorption to about one half, while at the temperature of the boiling point of water most absorbed gases are expelled. With a diminished pressure of say half an atmosphere, about half the gas is expelled; while at an increased pressure of say two atmospheres, more gas can be absorbed. Thus in respect of carbonic acid, for instance, every atmosphere pressure augments the capacity of water to absorb this gas by 1·8 volumes, so that at five atmospheres it absorbs nine times its own volume of the same.

The absorption of gases by other liquids than water is a subject still open for investigation, and has thus far only been determined for a few gases. So Dr. Vander Weyde of New York found in regard to laughing gas, that alkaline solutions absorb more than pure water, and alcoholic liquors most, strong alcohol over five times its volume; solutions of neutral salts in general absorb the same amount as water, except the sulphates, which absorb much less of the gas, while acids absorb the least, especially diluted sulphuric acid, which absorbs only 0·3 to 0·05 of its volume, according to its strength. **III. Absorption of Heat.** The capacity of bodies to absorb heat is in direct proportion to their capacity to emit heat. Light-colored, polished, or smooth surfaces possess this capacity in the least degree, while dark-colored and rough surfaces absorb heat very readily. However, according to the late researches of Melloni, this effect depends less upon the apparent color than upon the nature of the coloring material. He also finds that when the heat-giving body is not luminous, the color is without influence; but when it is luminous, the color has great influence. Melloni has also determined the capacity of absorption of heat by different transparent substances. He found that while transparent rock salt absorbed only 8 per cent. of the heat passing through with the light, fluor spar absorbed from 25 to 50, Iceland spar and glass 60, alum 90, and ice 94 per cent.; while for heat emitted from a non-luminous body, the latter substances were totally opaque, absorbing all the heat and transmitting none. Recently Tyndall and Magnus have made researches on the absorbent power of gases, and found that under the pressure of one atmosphere, the source of heat being a copper ball heated to 518° F., the absorption by dry air being accepted as the unit, hydrogen was also 1, chlorine 39, carbonic acid 90, nitrous acid 355, marsh gas 403, sulphurous oxide 710, olefiant gas 970, and ammonia 1,195; which means that the latter two gases absorb respectively 970 and 1,195 times more of the heat transmitted through them than is the case with dry air. **IV. Absorption of Light.** The apparent color of all objects is caused by the elective absorption of certain colored rays in the white light, while the remaining are reflected and determine the color of the object. Even the purest white and the most perfectly polished surfaces absorb some of the light. It is the same with the most transparent substances; they all absorb light more or less. In many of these an elective absorption also takes place; colored gems and glass or liquid solutions absorb certain colored rays and let others pass; those which pass determine the color of the substance. Sometimes, besides the absorption of several colors, a color is reflected complementary to that transmitted; in a thin layer of aniline red, red rays are transmitted, while green rays are reflected; a similar action takes place in a solution of litmus and several other substances. Some crystals possess the power of absorbing different colors when light passes through them in different directions; this is called dichroism and polychroism. Thus the mineral iolite, a gem consisting of alumina, magnesia, and iron, shows different colors according as the light falls along the axis of crystallization or in a transverse direction. Many artificial crystals exhibit the same remarkable property; for instance, the double chloride of platinum and potassium, which appears either deep red or bright green. The investigation of this peculiar kind of absorption of light has recently given rise to the invention of a new modification of the microscope by Haidinger, by which this property may be examined in the minutest crystals; this invention is called the dichroscope and dichroic microscope. **V. Absorption Spectrum.** The elective absorption of transparent gases, liquids, and solids is determined by means of the spectroscope. This instrument proves indeed that the cause of this absorption is simply the incapacity of the transparent substance to transmit luminous waves of a certain length, and thus that it is opaque for such waves. The result of such partial opacity is the formation of the so-called absorption bands, in case such a substance is placed between the light and the slit of the spectroscope. The Fraunhofer lines in the solar spectrum are in fact nothing but absorption bands produced by the passage of the light through the solar atmosphere; our own atmosphere also produces such bands, which spectroscopists call the atmospheric lines. The absorption spectrum differs in each substance which we may submit to examination. Thus iodine vapor and nitrous acid vapor produce very characteristic absorption spectra when placed before the slit of the spectroscope (figs. 1 and 2), while different solutions of apparently the same color may be unmistakably distinguished from each other by the difference in the absorption spectra which they produce. The most striking illustration is given by the black absorption bands produced by a perfectly clear and colorless solution of any salt of the rare metal didymium, so that in this way the merest traces of this metal in any solution may be detected, as lately

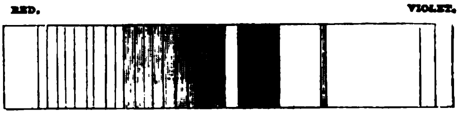


FIG. 1.—Absorption Spectrum of Iodine Vapor.

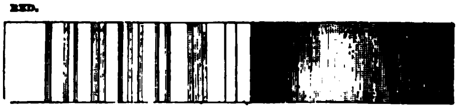


FIG. 2.—Absorption Spectrum of Nitrous Acid Gas.

found by Gladstone and Bunsen. Water, faintly colored yellow with a few drops of blood, may be distinguished from all other solutions of the same color, by showing in the spectroscope two characteristic absorption bands (fig. 3) in the green portion of the spectrum, not shown by any other substance; and it is even possible to recognize them in a single blood disk, by means of a microscope with spectroscopic eye piece. We add in fig. 4 the absorption bands of the solar atmosphere for comparison; they are used as landmarks to localize the absorption bands of other substances. They were first noticed by Wollaston, but afterward examined with such philosophical refinement by Fraunhofer, that they were named after him, and according to his proposition designated by A, B, C, D, &c. (See SPECTROSCOPE.)

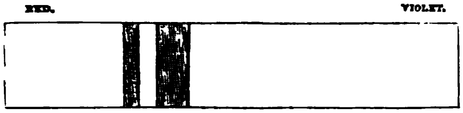


FIG. 3.—Absorption Spectrum of Blood.

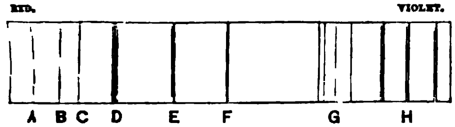


FIG. 4.—Solar Absorption Lines.

ABSTINENCE, the partial or total deprivation of food. The phenomena which characterize life are connected with chemical changes occurring in portions of the blood or tissues of the body itself; the presence of the substances resulting from these changes being hurtful to the body, they are eliminated from it by the various organs of excretion. This constant loss demands an equivalent supply. If the supply be withheld, the chemical changes still continue and the body wastes; the organism feeds upon itself, and when this is no longer possible, death ensues. The period during which a human being previously in good health can sustain life under a total deprivation of food and drink, is generally stated to be from eight to ten days. This varies, however, under different circumstances. Persons of mature age support abstinence better than those who are younger; women, from the greater development of the fatty tissues, and the less activity of the muscular and nervous systems, better than men; children, in whom all the organic functions are exceedingly active, worst of all. A damp atmosphere which checks exhalation, a moderate temperature, and quiet of body are favorable to the prolongation of life; while muscular exertion, a hot dry air, and a low temperature tend to shorten the period during which it can be preserved. Fodéré (*Médecine légale*) states that some workmen buried in a damp quarry were extricated alive after a period of 14 days; while after the wreck of the Medusa, the sufferers on the raft, exposed to a high temperature and constant exertion, at the end of three days, although they still had a small quantity of wine, were so famished that they commenced devouring the dead bodies of their companions. Water alone tends materially to prolong life. Dr. Sloane ("Medical Gazette," vol. xvii., p. 389) gives an account of a man 65 years of age, who was rescued from a coal mine after he had been immured 23 days, during the first 10 of which he had a little muddy water. He was so much reduced that he died three days after. The cases of starvation which have been best and most accurately observed, have been those in which the œsophagus has been gradually but at last completely obstructed by cancerous disease. In these cases the deprivation of aliment has been but partial, the patient having been still imperfectly nourished by nutritive injections, which have supported life for a period of five or six weeks. Mental alienation has a marked influence in prolonging the period during which life can be sustained without food. Dr. Willan has recorded a case in which, under the influence of religious delusion, a young man lived 60 days, taking during that time nothing but a little water flavored with orange juice. Dr. M'Naughton of Albany ("American Journal of Medical Science," vol. vi., p. 543) gives a similar instance, during which a young man lived 54 days on water alone. And in a case read in the French academy (*Archives générales de médecine*, tom. xxvii., p. 130), a suicide lived 60 days on nothing but a few mouthfuls of orgeat syrup, before death put an end to his sufferings. Hysterical women often support abstinence in a wonderful manner; but there is in hysteria so much moral perversion, so great a tendency to deceit for the sake of exciting interest and sympathy, that all such cases require to be carefully and closely scrutinized. Most of the instances reported by the old authors, in which total abstinence was endured for months or even years, belong to this category, and are untrustworthy.—The first effect of prolonged abstinence from food and drink under ordinary circumstances, apart from the sensations of hunger and thirst, is pain and distress in the epigastrium, which is relieved by pressure. This subsides after a day or two, and is succeeded by a sense of sinking and weakness in the same region; the thirst at the same time becomes more intense, and is thenceforth the principal source of suffering. Emaciation soon begins to make rapid progress, the eye has a wild glistening stare, the senses are dulled, and the intellect enfeebled; the excretions become rare, scanty, and fetid; the urine is high-colored, often causing a burning pain when passed; often toward the end diarrhœa comes on. The sufferer becomes exceedingly weak, the voice is low and hoarse, the gait slow and tottering, and at length all exertion is impossible; the breath is offensive; the skin is covered with a dirty-looking secretion and exhales a putrid odor. Maniacal delirium often supervenes, and death is sometimes preceded by convulsions. When persons are immured by the falling in of a mine, quarry, &c., they seem subdued by the darkness; but in cases of starvation after shipwreck, or in travelling through an uncultivated country, the worst passions are aroused, and suspicion and ferocity add to the torments of hunger. A high temperature seems to aggravate these passions. "It is impossible to imagine," says M. Savigny, in speaking of the wreck of the Medusa, "to what a degree the circulation is quickened under exposure to the burning sun of the equator. The pain of my head was intolerable; I could scarcely master the impetuosity of my movement; to use a well-known phrase, the blood boiled in my veins; all my companions suffered from the same excitement;" and the terrible scenes of blood and crime which passed upon the raft were doubtless owing largely to this cause.—On examination after death the bodies of those dying of starvation are found to be almost bloodless, except the brain which contains its usual quantity, and completely destitute of fat. The various organs, with the exception of the brain, are all reduced in bulk, and the coats of the intestinal canal especially are rendered thinner. M. Chossat (*Recherches expérimentales sur l'inanition*) deprived a number of animals (birds and small mammals) of all sustenance, and carefully observed the phenomena that followed, and his experiments throw much light upon the subject of starvation. The temperature in all the animals was maintained at nearly the normal standard until the last day of life, when it began rapidly to fall. The animals, previously restless, now became quiet, as if stupefied; they fell over on their side, unable to stand; the breathing became slower and slower, the pupils dilated, the insensibility grew more profound, and death took place either quietly or attended with convulsions. If, when these phenomena were fully developed, external warmth was applied, the animals revived, their muscular force returned, they moved or flew about the room, and took greedily the food that was presented to them. If now they were again left to themselves, they speedily perished; but if the external temperature was maintained until the food taken was digested (and from the feeble condition of their digestive organs this often took many hours), they recovered. The immediate cause of death seemed to be cold rather than starvation. The average loss of weight in the animals experimented upon was 40 per cent., varying considerably in different cases, the variation depending chiefly on the relative amount of fat. Weighing the different tissues separately, and arranging them in two parallel columns, according as they lost more or less than 40 per cent., gave the following results:

Parts losing more than 40 per cent.		Parts losing less than 40 per cent.	
Fat	93·3	Muscular coat of stomach	39·7
Blood	75	Pharynx and œsophagus	34·2
Spleen	71·4	Skin	33·3
Pancreas	64·1	Kidneys	31·9
Liver	52	Respiratory organs	22·2
Heart	44·8	Bones	16·7
Intestines	42·4	Eyes	10
Muscles of voluntary motion	42·3	Nervous system	1·9

Among the most noteworthy phenomena caused by starvation are the offensive effluvia exhaled from the sufferers, the fetor of their discharges, and the rapidity with which the body passes into a state of putrescence. Such a condition of things is peculiarly favorable to the reception of fever and other contagious diseases, and they acquire in such cases an intensity and virulence rarely seen under other circumstances. Thus, as was fearfully seen in Ireland in 1847, pestilence follows in the train of famine. The effects of the prolonged employment of an insufficient diet alone are rarely seen; they are commonly complicated with those of unwholesome air and over-exertion. Of such complication, prisons, work-houses, and charitable institutions have afforded abundant examples on a large scale. One of the most noted of these occurred at the Milbank penitentiary, near London, in 1823. The prison is situated on marshy ground, which is below the level of the adjacent river, but it had previously been reputed healthy. A few months before the outbreak of the epidemic, the amount of dry nutriment allowed each prisoner daily had been reduced from between 31 and 33 oz. to 21 oz., and animal food was almost wholly withheld. The prisoners were at the same time subjected to a low temperature, and to considerable muscular exertion. In a short time they became paler, weaker, and thinner; subsequently, scurvy, diarrhœa, and dysentery made their appearance, and finally low fevers, or headache, vertigo, convulsions, maniacal delirium, and apoplexy. The smallest loss of blood caused fainting. Of 860 prisoners, 437, or 52 per cent., were attacked. Those who had been longest confined suffered in the greatest proportion. The prisoners who were employed in the kitchen, who had an addition of 8 oz. of bread to their daily allowance, were not affected. Another well-marked epidemic, owing to a similar cause, occurred in the establishment for the destitute children of New York, at what was termed the Long Island farms, in the winter of 1839–'40. The diet of the children consisted of bread of an inferior quality, with tea sweetened with molasses, night and morning, and soup made from coarse beef, alternately with the beef itself at noon; in addition the dormitories of the children were crowded and ill ventilated, and they had scarcely any outdoor exercise. "About the middle of December, 1839," says Dr. Morrell, the attending physician of the asylum (New York "Journal of Medicine and Surgery," vol. iii.), "evidences of a constitutional change in many of the children were apparent; they were dull and inactive, their eyes lacked lustre, and their skins exhaled an offensive odor." Next, many of them were attacked with slight cholera morbus, and afterward an incurable diarrhœa set in, attended with gangrene about the cheeks, the anus, or vagina. In most of these cases sloughing of the cornea took place and the eye was destroyed. When for a length of time the allowance of food, either from its indigestibility or from its limited amount, has been insufficient for the wants of the system, the digestive organs are weakened; the appetite is lost, and the person often loathes food while he is suffering from starvation. In the experiments of Chossat, when turtle doves were placed upon a limited allowance of corn, but with access to water, part of the corn was either rejected by vomiting, accumulated in the crop, or passed unchanged through the bowels.

ABSTINENCE, Total. See Total Abstinence.

ABT, Franz, a German composer, born at Eilenburg, Saxony, Dec. 22, 1819. His early studies were theological, but he abandoned divinity for music, and at the age of 22 became musical director at Zürich. He remained there eleven years, when he became second musical director at the Brunswick court theatre, and was promoted to be first by the grand duke in 1855. He has composed for orchestra, piano, and voice; but it is mainly as a song writer that he has attained his reputation, having composed a great number of songs that have become well known throughout the world. He has also been very successful as a composer of two-part songs, and of four-part songs for male voices. He visited the United States in 1872.

ABUBEKR, the first caliph, born at Mecca about 573, died in 634. Abubekr means "father of the virgin," and this name was given to him when his daughter Ayesha became the favorite wife of Mohammed. His real name was Abd-el-Caaba. He was Mohammed's most trusted adherent, and in 632 succeeded his master in the supreme authority, to the exclusion of the prophet's son-in-law Ali. At the commencement his reign was troubled, first by the relapse of several tribes to idolatry, and then by the springing up of a new sect under Mosseilama. Assisted by the hero Khaled, Abubekr compelled the backsliders to return, and suppressed the rival creed, Mosseilama himself being slain in a battle. He now led his followers to conquest. His generals fell upon the frontiers of the Roman and Persian empires, and their easy success excited the warrior population of Arabia to pour forth. The emperor Heraclius vainly opposed them. Syria and the provinces of the Euphrates were soon overrun and Damascus besieged. Abubekr died in the full tide of conquest, after a brief reign of two years and three months. His tomb is shown by the side of that of the prophet at Mecca. Abubekr was surnamed the Just. His charity was unbounded, while his manner of living was so strict that he possessed at his death only the one robe he wore, one camel, and an Ethiopian slave. These he bequeathed to Omar, his successor. Abubekr collected the scattered writings and the oral doctrines of Mohammed forming the Koran.

ABUL-CASIM. See Albucasis.

ABULFARAGIUS, or **Abulfaraj, Mar Gregorius,** surnamed, on account of his Jewish descent, Bar-Hebræus, a Syriac and Arabic writer, born in 1226, died in 1286. He was a native of Armenia, and the son of a converted Jew. By his knowledge and virtues he rose to the dignity of bishop of Aleppo, and in 1266 to that of primate of the Jacobite Christians. His best known work is the "History of the Dynasties," treating of the different kingdoms of the world, Jewish, Chaldean, Persian, Greek, Roman, Mohammedan, and Mongol. An edition in Arabic and Latin was published by Edward Pococke at Oxford, 1663, and one in Syriac and Latin at Leipsic, 1789.

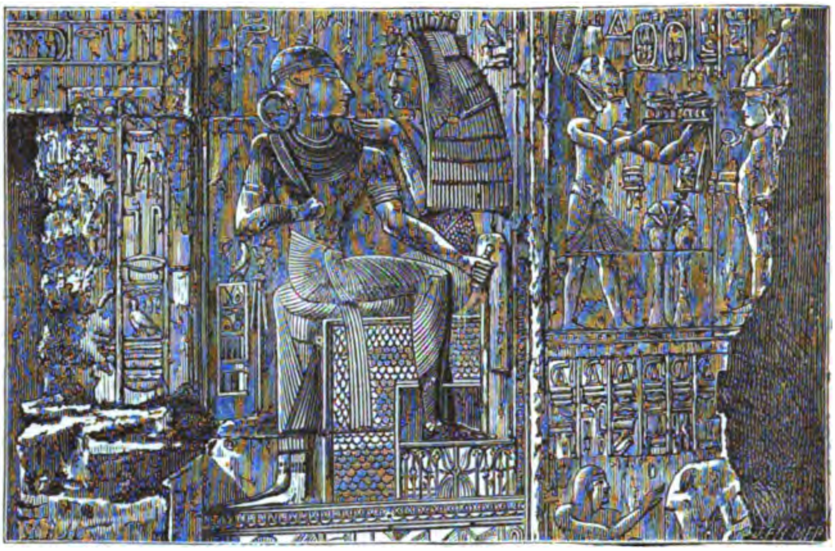
ABULFEDA, Ismail ibn Ali, a Moslem prince and writer, born at Damascus about 1273, died in October, 1331. He was a descendant of Eyub (or Ayub), the founder of the Kurdish dynasty in Egypt; fought in the campaigns of Sultan Nasir, of Egypt and Syria, against the Tartars; was by him appointed governor of Hamah in Syria, which his ancestors had held in fief, and subsequently acknowledged as sultan of that principality. He was a man of eminent talents as a warrior, a ruler, and a writer. He is chiefly renowned as the author of an extensive historical compilation, in Arabic, embracing both ancient history and the annals of the Moslems, from the time of Mohammed to the year 1328; and of a geographical work, mainly descriptive of Egypt, Syria, Arabia, and Persia, considered the best of its kind in eastern literature. Both have appeared in various editions, in the original as well as in Latin and other occidental translations. Abulfeda also wrote scientific treatises, which have been lost.

ABU SAMBUL. See Ipsambul.

ABU SHEHR. See Bushire.

ABU TEMAM, one of the greatest Arabic poets, born in Syria about 806, died at Mosul in 845 or 846. His poems are said to have procured him the favor of the Moslem courts and many thousand pieces of gold, and the Arabs say of him that "no one could ever die whose name had been praised in the verses of Abu Temam." He was also the compiler of three collections of select pieces of eastern poetry, the most esteemed of which, called the *Hamasa*, is praised by Sir William Jones.

ABYDOS. I. An ancient city of Asia Minor, on the narrowest part of the Hellespont, opposite Sestos, originally the possession of the Trojan prince Asius, and later occupied by the Thracians and Milesians. It is celebrated in connection with the army of Xerxes and the immense bridge built by him at this spot, 480 B. C. Here the tragedy of Hero and Leander took place, according to the poetical legend, and here Lord Byron swam across in imitation



Bass-Relief at Abydos, Egypt. (From a Photograph.)

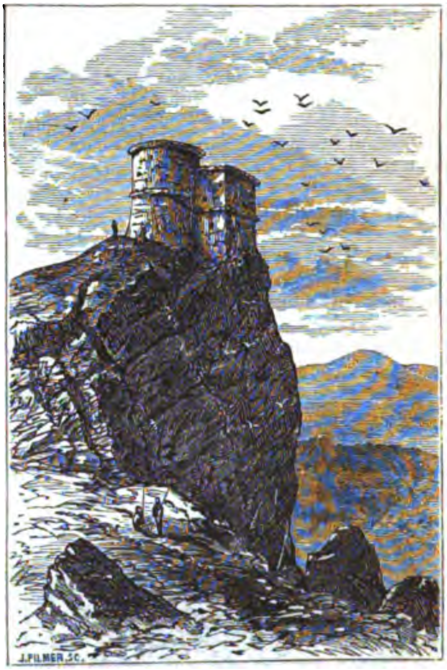
of that luckless lover. **II.** An ancient city (originally *This*, now *Arabat el-Matfoon*) of Upper Egypt, on the canal called the Bahr Yusuf, 6 m. W. of the Nile and about 60 m. below Thebes. It was anciently the second city of the Thebaid, the birthplace of Menes, and the reputed burial place of Osiris, and hence a great necropolis. There are numerous very ancient tombs cut in the adjacent hills, but its most remarkable remains are the palace of Memnon and the temple of Osiris. In the latter was discovered in 1818 the celebrated "tablet of Abydos," or Ramses table, at present in the British museum, upon which is inscribed in hieroglyphics a genealogy of the 18th dynasty of the Pharaohs. Dümichen, in his explorations (1864–'5) of the interior of the temple of Osiris, found a new Egyptian table, which Lepsius calls the Sethos table. It is more complete than that of Ramses, contains 65 shields and an uninterrupted record of the kings of the first three dynasties, beginning with Menes, corresponding with the account of Manetho, and is regarded as more perfect than the table of Sakkarah. This discovery is believed to be important in respect to the researches into the most remote eras of Egypt.

ABYLA, one of the pillars of Hercules, at the N. W. extremity of Africa, opposite Calpe (now Gibraltar) in Spain, the other pillar. It was believed by the ancients to have been formerly joined with Calpe, but separated by Hercules, giving entrance to the Mediterranean.

ABYSSINIA (Arab. *Habesh*, signifying a mixture of peoples), a country of eastern Africa, lying S. W. of the Red sea. Its boundaries are not very accurately defined, especially as the name is frequently applied to a much greater extent of territory than that included in Abyssinia proper, which was formerly said to comprise the three important states of Tigré, Amhara, and Shoa, but from which Shoa has been excluded by some modern geographers. According to Keith Johnston, however, it extends from lat. 8° 30′ to 16° 30′ N., and from lon. 34° 20′ to 43° 20′ E. On the N. and N. W. it is bordered by Nubia and Sennaar, while southward and eastward lie the Galla and Somali countries and Adal. The Samhara land separates Abyssinia proper from the Red sea, which is nowhere less than 90 m. distant from the frontier. According to M. d'Abbadie, the country is called Ethiopia by the natives, who properly employ the word Abyssinia to denote that portion of the population, for the most part professedly Christian, who have lost all idea of tribal differences. Its maximum length is upward of 600 m. and maximum breadth nearly as much; but these estimates are probably approximate, and as the area of the country depends upon them, it cannot be accurately stated. The population is believed to be from 3,000,000 to 5,000,000.—Considered with reference to its physical geography, Abyssinia is an extensive, elevated, and irregular table land, consisting of a series of plateaux of various altitudes, which rise into isolated groups and ranges of flat-topped mountains. This table land runs nearly due N. and S., and slopes from its highest ridge toward the Red sea on one side and the interior of the continent on the other, so as to form an eastern and a western watershed. Toward the swamps and plains of Sennaar and Nubia the descent from this high region is gradual, but it is very abrupt on the east, the seaward slope being about twelve times greater than the opposite slope toward the Nile. The average elevation of the plateaux, which rise terrace-like and with gradually increasing elevation from N. to S., is between 7,000 and 8,000 ft. Among them, forming river beds sometimes thousands of feet below the general surface of the surrounding territory, wind ravines and gorges of extreme depth, which are among the most striking natural features of the country. Mr. Clements R. Markham, who accompanied the British military expedition to Magdala, classifies the Abyssinian highlands as follows: 1, the region drained by the affluents of the river Mareb; 2, the region drained by those of the Tacazze and Atbara; 3, the region drained by those of the Abai. The first of these is in Tigré, and includes a considerable portion of northern Abyssinia. Here the average altitude of the plateaux is 9,000 ft. above the level of the sea. They enclose numerous extensive valleys, which, although many hundred feet lower, are none of them at an elevation of less than 7,000 ft. A peculiarity of the valleys here is that valley hills rise from their level tracts, just as mountains rise from the plateaux above. The principal summits of this region are Mt. Sowayra, 10,328 ft., and Arabi Tereeki, near Senafe, 8,560 ft. The next great physical division of the table land comprises the drainage basin of the Tacazze and Atbara rivers. The loftiest district of this region is the rich agricultural plain of Haramat, 8,000 ft. above the ocean level. In the N. W. part of Amhara, which is included in this division of the highlands, the country is lower, not exceeding 6,000 ft. of average elevation; but the province of Semyen contains the highest mountains in Abyssinia, of which the most important peaks are the Abba Jarrat, in lat. 13° 10′ N., 15,088 ft., and Mt. Buahat, in lat. 13° 12′ N., 14,862 ft. E. of these are the Harat hills and Wadjerat range. The third clearly defined region is that watered by the tributaries of the Blue Nile, comprising the greater portion of Amhara or the former kingdom of Gondar, with an altitude varying in different districts from 5,000 to 7,000 ft. on the plateaux, and attaining a height of 11,000 ft. in the Talba-Waha mountains. The Wadela and Dalanta plateaux, near Magdala, with an elevation exceeding 9,000 ft., are in the W. portion of this region, the river bed of the Jitta, 3,500 ft. deep, running between them. The steep scarped rock of Magdala itself rises to a height of 9,050 ft., its summit being a flat plain 2½ m. long and half a mile wide.—The only important rivers of the country which flow toward the Red sea are the Ragolay, in the north, a perennial stream which loses itself in the sand before reaching the coast, and the Hawash in the south, which forms a portion of the boundary between Abyssinia and Adal, and is likewise absorbed in the swamps or deserts on its path to the ocean. All the great Abyssinian rivers belong to the Nile basin. Of these the Mareb is the most northern. It rises in the district of Hamasen, flows S. and W. around Serawe, and thence in a N. W. direction through the Nubian province of Taka. In the rainy season its waters reach the Atbara, but during the remainder of the year they disappear in the sand. The Tacazze rises in Lasta from a spring which was first caused to gush forth from the rock, according to tradition, by a blow from the hand of Menilek, son of the queen of Sheba. Its name signifies "the terrible." Flowing northwesterly, it enters, or properly receives, the Atbara at Tomat, in Nubian territory. It is a rapid and impetuous stream, dashing down rocky falls and between lofty pre-

View in the Mountains near Magdala.

cipices with a turbulence well denoted by its name. Further S. is the Abai, the celebrated Nile of Bruce, although the Bahr-el-Azrek or true Blue river rises in the Galla country under the name of the Dedhesa, and the Abai is in reality only its largest tributary. The latter rises S. of the Tzana lake, and making a northward circle through it, turns southward and joins the Bahr-el-Azrek near lat. 11° N. This lake, also called the Dembea, is situated in a grain-producing region of great fertility, at a height of 6,110 ft. above the level of the sea. It is about 50 m. long by 25 m. wide, and its depth in some places is said to be 600 ft. There are many other lakes, among which Ashangi, 4 m. long and 3 m. broad, in the country of the Azebo-Gallas, is the most noteworthy as being a fresh-water lake without any visible outlet. Thermal springs occur in many districts.—The characteristic feature of the climate of the Abyssinian highlands—including Tigré, Amhara, and Shoa—is the occurrence of a tropical monsoon or rainy season from the middle of June to the end of September. Otherwise, the climate is strictly temperate. There is a cold season extending from October to February, with an estimated mean temperature of 58·3°, during which the days are pleasant and the nights cold with heavy falls of dew. The hot weather begins about March 1, and lasts until the monsoon sets in, April being the warmest month. The mean temperature of this season at Magdala is 65·5°, and of the wet season about 5° lower. The rainfall of the monsoon extends over all of Abyssinia proper, but is greater in the south and west than in the north and east. The prevailing winds during the rainy season are easterly and southeasterly. Thunder storms are of frequent occurrence.—The chief agricultural productions are barley and oats on the elevated plains, and wheat, maize, millet, rice, cotton, coffee, and a small native grain called *teff*, in the lower districts. Sugar cane, flax, and beans are raised in small quantities, and lemons, oranges, and figs are occasionally produced. The grape thrives in some parts of Tigré, but no good wine is made. —Volcanic rocks constitute the principal formation in the geological structure of Abyssinia, and cover almost the entire table land. The trappean series appears to be divisible into at least two distinct groups. The lower of these is largely composed of red basalts, on which the disintegrating effects of atmospheric action are plainly marked. Blanford names this the Ashangi group, and that above it the Magdala group; which last comprises trachytic rocks containing many feldspar crystals, and is distinguished by the scarped and precipitous forms which it assumes under the influence of the weather. These forms are characteristic of Abyssinian scenery, and the ambas or hill forts, the great strongholds of the country, are rendered almost inaccessible to an enemy by their situation on the horizontal beds of this rock which surmount the summits usually selected for military stations. In the N. E. provinces, however, metamorphic rocks occupy the whole surface, except in several districts of limited extent where they are overlaid by sandstones, limestones, or igneous formations. They extend 150 m. along the meridian of 39° 30′, between lat. 15° 55′ and 18° 50′ N. At Tchelga coal deposits are found, which geologists are disposed to group with these sandstones of Adigerat. Further S., in the Antalo district, a considerable number of fossils have been obtained from the limestones which predominate there, whereby it has been ascertained that the formation belongs to the oölitic period. The present geological aspect of Abyssinia, with its weather-worn battlements of rock and its deeply scored river beds, must be attributed to fresh-water denudation. There is no evidence of marine action anywhere in the interior, although it is believed that at an early epoch the waters of the Red sea and the Indian ocean may have washed the foot hills of the eastern slope. The volcanic formations along the coast belong to an age much more recent than that which gave rise to those of the table land which have already been described. There are no volcanoes in the country. The only metallic products are gold, which occurs rarely and is of an inferior quality, and iron, of which the yield is consumed at home. Extensive deposits of salt occur on several plains in Tigré.—The distribution of Abyssinian animals seems to be regulated by the altitude of the



Hill Fort between Mai and Abaca.

various portions of the table land above the sea, each zone of elevation being characterized to some extent by its own particular fauna. It is a noteworthy fact that many of the mammals common to other countries are here distinguished by a much bolder demeanor toward man than that which they exhibit elsewhere. Elephants are numerous near the coast, and go up to the highlands, even 8,000 ft. above the sea, in the summer months; though the rhinoceros, only one variety of which (*R. keitloa*) is met with, does not range higher than 5,000 ft. Many of the elephants are tuskless, but they are all active and savage. The rhinoceros is the black, two-horned species, and feeds on foliage, seldom eating grass. Of the cat tribe, there are at least three species in addition to the Abyssinian lion. The spotted hyæna (*H. crocuta*) and two species of jackal are exceedingly common. Of the quadrumana, the great dog-faced baboon (*cynocephalus hamadryas*) is found almost everywhere. That peculiar little pachyderm, the hyrax, inhabits its favorite haunts among the rocks at almost every elevation in Abyssinia from 2,000 ft. above the sea upward. The ornithology of Abyssinia is rich in species, no fewer than 293 having been described by Blanford. Among the birds of prey are found the eagle, the vulture, and the handsome Abyssinian lammergeyer, as well as numerous falcons and kestrels. Honey birds, starlings of beautiful plumage, crows, pigeons, several varieties of the cuckoo, swallows, larks, partridges, geese, ducks, and guinea fowls abound. With the exception of lizards, there do not seem to be many reptiles in the highlands. A tree snake, a viper, and several other species of serpent occur; two species of tortoise, and frogs and toads in large numbers, are also met with. The crocodile and python inhabit the tropical districts.—The agricultural products of the country have already been enumerated. The vegetation of the coast lowlands consists principally of acacias, which are replaced by sycamores, dahros (*ficus religiosa*), and mimosæ, in ascending toward the interior. In the passes, the beautiful candelabra tree (*euphorbia Abyssinica*) is found. At an elevation of 6,000 ft. occur juniper trees, which here grow tall and large, the jujube, wild olives, and several trees of the fig tribe. This vegetation is sub-alpine, and common to the plateaux. The flora of the higher regions is characteristic of the temperate zone, the only tree being the juniper, which grows merely as a bush on the loftier mountain sides and summits, together with lavender, thyme, gentian, and the wild rose. Large dahro trees are generally found about the villages, and a variety of willow occurs near streams and in damp places; but though there are some trees on the plains below the plateaux, low bushes form the greater proportion of their vegetation. In fact, the only thickly wooded localities are the gorges and ravines.—Each of the three principal political divisions of Abyssinia, Tigré, Amhara, and Shoa, is subdivided into numerous smaller provinces. Formerly the rulers of these three sovereignties were subject to the monarch of the country, but on the decline of the central power in the last century they became practically independent. The town of Adowa, with about 8,000 inhabitants, is the metropolis of Tigré. Gondar, the seat of government in Amhara, and formerly the residence of the Abyssinian kings, is situated in the district of Dembea, N. of the Tzana lake, and has a population estimated at 50,000. Ankobar, a town containing about 12,000 people, is the present capital of Shoa. The inhabitants of Abyssinia are usually classed into: 1, the Ethiopic people of Tigré, speaking a corrupt form of the ancient Geez language; 2, the Amharic tribes, living in Amhara and Shoa; 3, the Agows, of Wag, Lasta, and other provinces, who are by some conjectured to be of Phœnician origin. Besides these are the Gallas who have settled in Amhara and Shoa. Coptic Christianity is the prevailing faith, but there are many Mohammedan and Jewish communities. (See ABYSSINIAN CHURCH.) In point of morality, the latter are generally superior to the Christians. Education is confined almost solely to those intended for the church. Superstition is widely prevalent, and the people are strongly addicted to sensuality and bloodshed. Many peculiar customs prevail, and something of a literature once existed; but the effect of the long series of civil wars has been to render Abyssinian civilization unworthy of the name. Latterly the rule of the lesser chiefs throughout the country has been the only government of any stability.—The history of Abyssinia surpasses in interest that of any other country of Africa except Egypt. Its earliest traditions concern the queen of Sheba, who is said to have ruled over the powerful kingdom of Axum, holding her court at the town of that name, whence she proceeded on her celebrated visit to Solomon. All subsequent legitimate rulers of the nation or of the larger states have claimed to be descended from her. About A. D. 320 the patriarch of Alexandria consecrated Frumentius bishop of Abyssinia. Through his efforts and those of his successors, all of whom bore the title of *abuna salamah* (our father of peace), the Coptic church was firmly established. In 522 Caleb, then the reigning sovereign of Axum, led an army into Arabia and subjugated the kingdom of Yemen. The reign of Caleb is described as the golden age of Abyssinian history, during which a high degree of internal and commercial prosperity was attained; but the Mohammedan invasion of Egypt in the 7th century checked the inflow of civilization from the outer world, and brought the progress of the country to a standstill. For nearly 1,000 years Ethiopia was isolated by the surrounding barriers of Islam. About 1492 Pedro de Covilham, who had been sent to the East by King John II. of Portugal in search of the land of

Prester John, arrived at the court of Alexander, who then occupied the throne under the title of *negus* (king). On the death of Alexander, his successor, Negus David, was so young that his grandmother Helena acted for a while as regent, and through a mission to Portugal she secured the visit of an embassy from Lisbon to Abyssinia about 1520, an event which led to the subsequent active interference of the Portuguese in the affairs of the country. Estevan da Gama, the Portuguese viceroy in India and a grandson of the celebrated navigator, was ordered to aid the Abyssinians with a small armed force in their war against the Mohammedans of Adal, which had broken out about 1528, and had already lasted 12 years. Accordingly, in 1541, the first European military expedition into Abyssinia, numbering only 450 soldiers, with six cannon, landed at Massowa under the command of Cristoforo da Gama, the viceroy's brother. He defeated the Turkish forces under Mohammed Gran in many engagements, but finally his army was routed and he was killed in an important battle fought in 1542, probably near the Senafe pass. At this period began the barbarian incursions of the Galla tribes from the south, which occasioned a long series of wars between the Abyssinians and the more savage but fairer invaders, who finally succeeded in establishing themselves on a strip of territory, which they still occupy, separating Shoa from the rest of the country. The Jesuits never wielded a paramount influence in the state except in the early part of the 17th century. The authority of the negus appears to have been maintained unimpaired until about the middle of the last century. The Gallas had by this time become of importance as prospective allies in intestinal quarrels; and to propitiate them, Yasous II. married a Galla woman. This act so incensed the native Christians that they practically withdrew their allegiance from the negus, who lived but a few years after his marriage, and gave it to Ras Michael Suhul, the hereditary chief of Salowa in Tigré, who then became in fact the ruler of the country and governed it as long as he lived, although a nominal negus was placed upon the throne after the death of Yasous. It was during the administration of Ras Michael that the English traveller Bruce visited Gondar, in 1770. The authority of the negus had already become a nullity, the ras, who was ostensibly his minister, being in reality the ruler of the state. Soon the independent chiefs of the other provinces refused to acknowledge his sway. Shoa, Tigré, and Godjam, the S. W. province of Amhara, were virtually separate sovereignties for many years. A line of chiefs descended from a female representative of the ancient royal house ruled over Shoa; while Tigré was governed from 1790 to 1816 by Ras Walda Selassyé, who was visited at Antalo, his capital, in 1804, by Mr. Salt, the first Englishman to enter Abyssinia in an official character. Ras Ali of Amhara was the *de facto* governor of central Abyssinia from 1831 to 1855, although two princes, to whom he was minister, nominally ruled the country during this period. Between these dates the visits of numerous explorers made extensive additions to European knowledge of Abyssinia. In 1848 Mr. Walter Plowden, who had previously visited the court of Ras Ali at Debra Tabor in Tigré, was appointed British consul to Abyssinia. Lij Kasa, subsequently so famous as King Theodore, now appeared as an important character in Abyssinian politics. Born in 1818, he had been educated in a convent, as a scribe, whence a chance foray turned his thoughts to military affairs, and he became the leader of a predatory band of discontented soldiery, which grew to such dimensions as soon to be a power in the state. He then attacked the army of the mother of Ras Ali, who governed the district of Dembea for her son, and being successful was himself appointed to rule over it by the ras, who also bestowed upon the young chieftain the hand of his daughter in marriage. But this friendship was short-lived. Kasa recommenced war against his father-in-law, drove him from his dominions, subjugated the chief of Godjam and Dadjatch Ubyé of Tigré, and in 1855 found himself master of Abyssinia. He now caused the abuna to crown him king of the kings of Ethiopia under the name of Theodore. Plowden entered into official relations with the new government, and both he and his friend Bell, an Englishman in the emperor's service, resided in the country till 1860, when they were killed by insurgents. Up to this time Theodore had reigned tolerantly and with discretion; but the death of Bell and Plowden, to whom he was devotedly attached, together with the loss of his first wife, the daughter of Ras Ali, whose influence over him had always been excellent, wrought a great change in his character. His new wife, the daughter of a hos-

Abyssinian Warriors.

tile chief, in reality hated him, and henceforth he became morose, bloodthirsty, and tyrannical. Capt. Cameron, Plowden's successor in the consulate, arrived at Massowa in 1862 with presents from the queen for Theodore, which he delivered in October of that year. Theodore responded in a letter to the queen, proposing to send an embassy to England, which he transmitted through Capt. Cameron. To this the foreign office paid no attention, and the arrival of a messenger from England in 1864, with despatches for the consul but no answer to his letter, greatly incensed the king, who was already indignant at the refusal of the French government to recognize one M. Bardel, whom he had sent to Paris with a similar message to the emperor. In November, 1863, the German Scripture readers residing near the court and the missionaries in Dembea were thrown into prison, heavily ironed; and on Jan. 4, 1864, Capt. Cameron and his suite were seized and placed in close confinement at Gondar, whence, after having been subjected to brutal tortures, all the captives were removed to Magdala. News of their imprisonment reached England in the spring, and a communication in response to his letter was at once despatched to Theodore in charge of Mr. Hormuzd Rassam, a Mesopotamian holding the office of assistant to the British political resident at Aden. He landed at Massowa on July 23, 1864, but owing to various obstacles did not succeed in delivering the letter to the king till Jan. 25, 1866. It induced Theodore to set the prisoners at liberty and to promise that they should meet Mr. Rassam near the N. W. extremity of Lake Tzana and travel with him to the coast. He was anxious, however, that Mr. Rassam should write to England for workmen and await their arrival in Abyssinia; and this desire not being acceded to, he remanded the captives to prison, accompanied by Mr. Rassam and his comrades, who were violently taken into custody at an audience held in the king's tent just prior to their intended departure. Theodore then dictated a letter to Lord Clarendon asking for military stores, workmen, and an instructor in artillery, and sent it to London by Mr. Flad, who reached that city on July 10, 1866. The other Europeans remained captives in Abyssinia. As a communication from the queen, forwarded by Mr. Flad, and demanding the release of the prisoners, met with no response, the British government determined to attempt their rescue by force. A military expedition was organized at Bombay, under the command of Sir Robert Napier, consisting of 4,000 British and 8,000 sepoy troops. Annesley bay having been chosen as a landing place, the army was debarked there, and in January, 1868, commenced the march to the interior through the Senafe pass, and proceeded southward toward Magdala, about 400 m. from the coast, whither Theodore had retreated, and where the European prisoners were confined. On April 9 the English force arrived in front of the fortress, and on the following day were attacked by the Abyssinians, whom they repulsed with a loss of 700 killed and 1,200 wounded, having themselves but 20 wounded. This engagement is known as the action at Arogi, and its result so discouraged the king that he immediately released all the captives. Magdala was stormed on April 13, and captured with a loss of 15 British wounded. As soon as the outer gate fell, Theodore, determined

The Burning of Magdala during the Attack by the British.

not to be taken prisoner, placed the muzzle of his pistol in his mouth, fired, and fell instantly dead. The complete success of the undertaking led the government to raise Gen. Napier to the peerage, with the title of Lord Napier of Magdala. The departure of the expedition left the country in a state of anarchy. At the latest accounts a chief of Tigré named Kasa had succeeded in establishing his supremacy over a considerable region. He is said to be a weak man.—A tolerably complete bibliography of works relating to Abyssinia is given in Hotten's "Abyssinia and its People" (London, 1868). The more accessible English books on the subject comprise "Bruce's Travels," of which many editions have been published since the first in 1790; "The Highlands of Ethiopia," by Major W. C. Harris (London, 1844); "Life in Abyssinia," by Mansfield Parkyns (London, 1853); Hozier's "British Expedition to Abyssinia" and Markham's "Abyssinian Expedition" (London, 1869); and W. T. Blanford's "Geology and Zoölogy of Abyssinia" (London, 1870).

ABYSSINIAN CHURCH. According to the Chronicles of Axum, a work probably written by a Christian Abyssinian in the 4th century, the first apostle of Christianity in Abyssinia was the chamberlain of the Queen Candace of Ethiopia whose baptism is recorded in Acts vii. 27. But the actual origin of the Abyssinian church dates from about 316, when there landed on the coast of Abyssinia an exploring expedition sent out by Meropius of Tyre. Its members were all murdered except the two nephews of Meropius, Frumentius and Ædesius, who were presented to the king as slaves. After the death of the king, Frumentius became the instructor of the hereditary prince and actually regent of the country. When the prince became of age, Ædesius returned to Tyre; but Frumentius, who had previously organized the Roman and Greek merchants residing in Abyssinia into a Christian church, went to Alexandria and was consecrated by Athanasius bishop of Abyssinia. As the king himself with a large portion of the people was baptized, Axum soon became the see of a metropolitan (*abuna*), with seven suffragans. The emperor Constantine vainly endeavored to prevail upon Frumentius and the Abyssinian prince to adopt Arianism. When in the 5th and 6th centuries the Monophysites obtained control of the patriarchal see of Alexandria, the whole Abyssinian church joined this sect. In the 6th century the Monophysite priest Julianus spread Christianity in Nubia, which for several centuries was a wholly Christian country, until in the 16th century Mohammedanism became predominant. Others of the sect gradually Christianized large tracts of the country. When the Portuguese in the 16th century opened a passage into the country, an attempt was made to bring about a union of the Abyssinian church with Rome. A Roman Catholic patriarch of Ethiopia was appointed, but his efforts were unsuccessful. The Jesuit missionaries, who first established themselves in the country in 1555, succeeded in 1624 in inducing the heads of the church to submit to the pope; but the union lasted only a few years, and the subsequent labors of the Jesuits and the propaganda in this direction were equally fruitless. Since 1841 Roman Catholic missionaries of the order of Lazarists have renewed the effort to establish a union between the Abyssinian and the Roman churches, and in 1859 King Ubyé of Tigré sent an embassy to make his submission to the pope; but the hopes raised by this event were disappointed, though several villages have been gained for the Catholic church, and placed under a vicar apostolic. In 1830 the first Protestant missionaries, Gobat (subsequently Anglican bishop of Jerusalem) and Kugler, arrived in Abyssinia; they were soon followed by others, among whom Isenberg and Krapf have become best known. They obtained political influence, and in 1841 a pupil of the English Protestant mission school in Cairo, Andraos, was consecrated, under the name of Abba Salama, abuna of Abyssinia by the Coptic patriarch of Alexandria. Through him they hoped to gain the Abyssinian church for an evangelical reformation, and the hope was strengthened when a prince apparently devoted to them became, under the name of Theodore, ruler over all Abyssinia. But Theodore, when his power was fully established, banished or imprisoned the missionaries; and the abuna, who remained friendly to the Protestants, though he did not like to hear of conversions, died a prisoner in 1867.—Having always been Monophysitic, disputes about the nature of Christ have not torn the Abyssinian church into factions; but it is agitated by discussions on what are termed the several nativities of Christ, of which the leading party at present reckons three. Recently controversies have arisen as to whether Christ possessed consciousness and a knowledge of good and evil while yet in the womb of the Virgin, and whether Christ is now equal or inferior to the Father in authority and power. But the most virulent dispute is whether the Virgin Mary is the mother of God, or only the mother of Jesus, and therefore whether she is entitled to equal honors with her Son. Circumcision is used in the Abyssinian church for both sexes, and precedes baptism. The Jewish sabbath is still observed as well as the Christian Sunday, and dancing still forms part of the ritual, as it did in the Jewish temple. Children are baptized by immersion and adults by copious affusion. The Nicene creed is used, the Apostles' being unknown. Communion is administered daily to the laity in both kinds. Confession is rigidly practised. Candidates for the priesthood must be able to read, to sing, and grow a beard, and they pay two pieces of rock salt as the price of being breathed upon by the abuna, and having the sign of the cross made over them. The orders in church government are abuna, bishops (*komur*), alaka, who has charge of the revenues, and priests and deacons, who prepare the communion bread. The bishops now have only the duty of keeping the churches and church utensils sacred; the seven dioceses into which the church was formerly divided have become extinct. Priests and monks are very abundant. It requires 20 priests and deacons to do the full duties of one church. The numerous monks are all placed under the jurisdiction of the etshege, the superior of the convent Debra Libanos in Shoa. He ranks next to the abuna, and his authority is greatly respected in all matters of faith. He governs not only the numerous convents of his own order, but also those of the second order of the country, that of St. Eustathius. The most celebrated convents are Debra Libanos in Shoa, St. Stephen on Lake Haik in the Yesbu country, Debra Damo and Axum Thion in Tigré, and Lalibela in Lasta. The secular priests are, as in the other oriental churches, allowed to be once married, but the monks take the vow of celibacy. The churches are small, and their walls are covered with hideous pictures of the Virgin Mary, the saints, the angels, and the devil. Each church has a *tabot* or ark of the covenant, on which its sanctity wholly depends; it contains a parchment bearing the name of the patron saint, and stands behind a curtain in the holy of holies, which only the alaka and the priest who consecrates the elements are allowed to enter. If a man has had four wives and outlives them all, he must go into a monastery or be excommunicated. The husband can break the marriage tie at any time by becoming a monk, and leave his wife to take care of the children. The priests have the power of granting divorces.—There is a version of the Bible in the ancient language of the empire of Axum, usually called the Ethiopian, but by the natives the Geez language. It was probably made from the Greek in the 4th or 5th century, and is still the only one used in the church services, though the ancient Ethiopian language is no longer spoken. The Ethiopian Bible contains all the books of the Roman Catholic canon, with several others, the best known of which is the book of Enoch. The total number of books is 81. A translation of the Old and New Testaments in the living Amharic language was made by Meeka, an Abyssinian, the companion of Bruce.—See Gobat, "Three Years' Residence in Abyssinia"; Isenberg's and Krapf's missionary journals in Abyssinia; Volz, *Die Christliche Kirche Aethiopiens* (in *Studien und Kritiken*, 1869, giving a review of all the information to be obtained from the recent literature on Abyssinia); Stanley, "The Eastern Church," pp. 96–99.

ACACIA, a genus of plants of the order *leguminosæ*, widely diffused over the tropical and sub-tropical regions of the earth; most abundant in Africa and Australia. They are trees or shrubs, rarely herbs, with small, usually inconspicuous petals and sepals, but with many (10–400) long stamens, which give to the heads or spikes of flowers great beauty. The pods are two-valved, jointless and woody, containing seeds of which some species are edible. The leaves are either pinnate in various degrees, or simply distended leaf stalks (*phyllodia*). In nearly all the species the leaves are pinnate at first, and as the plant grows gradually give place to the phyllodia, often showing all gradations between the two forms. The stems and branches are often armed with spines. The acacias are not only most ornamental trees, with slender branches, delicate foliage, and attractive flowers, but the timber is often of great value, as that of *A. Arabica*, which is much used in India for wheels; and the *A. Koa* has a fine, hard, and variegated grain. The bark contains much tannin. *A. Verek* yields gum Senegal, and *A. Nilotica* and *Seyal* gum arabic. Other valuable gums of a similar nature are obtained from other species. The flowers of *A. Farnesiana* yield by distillation a delicious perfume, much prized in the East. Many species are easily cultivated under glass. Little is known of the uses of most of the 420 species that have been described.

ACADEMY (Gr. Ακαδημεια), originally the name of a public pleasure ground situate in the Ceramicus (tile field), a suburb of Athens, on the Cephissus, said to have belonged in the time of the Trojan war to Academus, a local hero. In the 5th century B. C. this land belonged to Cimon the son of Miltiades, who beautified the grounds, gave free admission to the public, and at his death bequeathed them to his fellow citizens. They naturally became a favorite resort for all the loungers of the city, and Socrates was wont to hold forth in this delightful place. Plato taught his philosophy in its groves, and his school was hence named the Academic. As the Platonists were also called academists, so wherever an academist started a school, he called that school an academy. The word academy is used in English in two senses. In its unambitious acceptation it means a place of higher instruction for youths, ranking with the gymnasia of Germany. The name is also given to national military and naval high schools in England and America. But the word academy, in its larger acceptation, is employed to designate a society of learned men, established for the improvement of science, literature, or the arts. The first association of this sort recorded in history was called Musæon or Museum, and was founded in Alexandria by Ptolemy Soter, one of the generals and successors of Alexander the Great. This soldier, after he had got possession of Egypt, restricted his energies to maintaining a defensive balance of power and to the cultivation of letters and science. Gathering around him scholars of various attainments, he sought to attach them permanently to his court by collecting books and treasures of art. Rome had no academies. The Alexandrian example, if lost upon the Romans, was imitated by the Jews in Palestine and Babylonia, and to a degree also by the Nestorian Christians. The Arabian caliphs profited by the lessons taught them by their Jewish and Christian subjects, and improved upon them by founding establishments for the preservation and increase of learning from Cordova to Samarcand. Charlemagne, following the suggestion of the learned Alcuin, encouraged men of culture to assemble in his palace; but after his death nothing was heard of academies until toward the end of the 13th and beginning of the 14th century, when institutions of the kind were established at Florence, Palermo, and Toulouse, chiefly devoted to the cultivation of poetry. It was not till after the downfall of the Byzantine empire in the 15th century, and the revival of classical culture in western Europe, that academies of a more comprehensive kind were established in Italy. The *Accademia Pontaniana*, so called after its principal benefactor Pontano, was founded at Palermo in 1433 by Antonio Beccadella. The *Accademia Platonica*, founded by Lorenzo de' Medici in 1474, lasted till 1521, counting among its members Machiavelli and other illustrious men, who devoted themselves to the study of Plato and of Dante, and to the improvement of the Italian language and letters. This institution became the model of many others. Rome had its Lincei, Naples its Ardenti, Parma its Insensati, and Genoa its Addormentati. In other towns were the academies of the Confused, of the Unstable, of the Drowsy, the Dead, the Nocturnal, the Thunderers, the Smoky, and the Vagabonds. Most of these academies were endowed by the state or by some wealthy patron of learning. All those learned associations which are in point of fact academies, but which bear the name of societies, will be treated under that title. We shall now proceed to notice some of the most celebrated academies of the world, ranged according to their nationalities. **I. Italian Academies.** Italy is the mother country of modern academies. Jakeius, who in 1725 published at Leipsic an account of them, enumerates nearly 600 as then existing. We have already mentioned the first two; they did not live long. The most enduring and influential of all was the *Accademia della Crusca* (literally, academy of bran or chaff), so called in allusion to its chief object of purifying and winnowing the national tongue. It was founded in 1582 at Florence by the poet Grazzini. The dictionary of the Academy della Crusca was first published in 1612, and in its augmented form (Florence, 1729–'38) is considered the standard authority for the Italian language. The *Della Crusca* is now incorporated with two still older societies, and thus united they are called the royal Florentine academy. The *Academia Secretorum Naturæ* was established at Naples in 1560 for the cultivation of physical science, but was speedily abolished. This was succeeded by the *Accademia de' Lincei* (of the Lynx-eyed) at Rome, founded by Prince Federico Cesi in 1609, and dissolved after his death in 1632; but the name was revived in 1847 by Pius IX. in the *Accademia Pontificia de' nuovi Lincei*, a scientific association of resident and foreign members, which publishes its transactions. The *Accademia del Cimento*, or of experiment, was also instituted for the prosecution of inquiries in physical science, under the protection of Prince Leopold, brother of the grand duke of Tuscany. A collection of experiments was published in Italian by this academy in 1667, of which a Latin translation was made with valuable notes. The *Accademia degli Arcadi*, or of the Arcadians, at Rome, originated in 1690 from the social gatherings at the palace of Queen Christina of Sweden, and met in the open air, poets and poetesses only being admitted, and each member assuming the name of a shepherd. Its scope was afterward enlarged, and since 1726 it has met in summer in the Bosco Parrasio of Mount Janiculum, in winter in the Serbatojo. It publishes a monthly collection of pieces, called the *Giornale Arcadico*, which frequently contains curious archæological information. Pope Leo XII. was elected a member in 1824, and Louis Napoleon, then president of the French republic, in 1850. At Naples the *Reale Accademia delle Scienze e Belle Lettere* was established in 1749, and the *Accademia Ercolanea* in 1755. The purpose of the latter was to explain the remains which were exhumed at Herculaneum and Pompeii. Its first volume appeared in 1775. Further volumes have since been published under the title of *Antichità di Ercolano.* Another existing academy is the *Accademia Etrusca* at Cortona, founded in 1726. The royal academy of Turin, in whose volumes of transactions Lagrange first made himself known, is chiefly remarkable on that account. Padua, Milan, Siena, Verona, Genoa, all have academies which publish transactions from time to time. The earliest academies of fine arts are also Italian. That of San Luca at Rome was established in 1593 by Federico Zucchero, who erected a building for it at his own expense. Academies of fine arts also exist in the principal cities of Italy. **II. French Academies.** The earliest and greatest of the French academies, the *Académie française*, was instituted in 1635 by Cardinal Richelieu, for the improvement and regulation of the national tongue. The number of its members was limited to 40. They met three times a week at the Louvre. The most remarkable claim of this academy to fame is the dictionary of the French language published in 1694, after 50 years consumed in debate upon the words to be inserted as good French. Many additions have been made to this in successive editions, the 6th and latest of which was published in 1835. This academy was ridiculed by the French wits on account of its subserviency to the court and its personal jealousies against rising men of genius. Molière, for instance, was passed over. Boileau and Labruyère were only elected on the absolute command of Louis XIV. The witty Piron wrote his epitaph thus:

Ci-gît Piron, qui ne fut rien,
Pas même académicien.

The *Académie française* survived until it was abolished by the republican convention in 1793. The next of the French academies in date is the *Académie de peinture et de sculpture*, which was founded in 1648, received letters patent from Mazarin in 1655, and was abolished by the convention in 1793. The *Académie royale des inscriptions et belles-lettres* was instituted by Colbert under the patronage of Louis XIV. in 1663. At first it was called the *Académie des inscriptions et médailles*, consisted of four members of the *Académie française*, and was charged with drawing up inscriptions for the monuments erected by Louis XIV. and for the medals struck in his honor. It was remodelled and enlarged under its present name in 1701, and temporarily suppressed in 1793. The *Académie royale des sciences* was the last in date. It was organized in 1666 and entirely remodelled in 1699. In 1795 all these academies were revived in a new form by the directory, under the name of *Institut national.* Napoleon gave it a new organization in 1803, and called it the imperial institute of France. Louis XVIII., at the restoration, maintained the name *Institut de France*, but revived the old title academy for the component parts of the institute. The institute consisted then of four academies: 1, *l'Académie française;* 2, *l'Académie des inscriptions et belles-lettres;* 3, *l'Académie des sciences;* 4, *l'Académie des beaux arts.* A fifth academy, *l'Académie des sciences morales et politiques*, founded in 1795, was suppressed at this time, but reëstablished in 1832. As these five academies are the most important of the kind in the world at present, we add a particular description of their constitution. The institute numbers 233 full members, together with 7 secretaries; each of the members has a yearly salary of 1,500 francs, and the secretaries have 6,000 francs each. There are also 43 honorary academicians, who receive no pay, 32 associates, and 215 correspondents. The five academies bear the same relation to the institute that colleges do to a university. The *Académie française* consists of 40 members, elected after personal application, and submission of their nomination to the head of the state. It meets twice a week, and is the highest authority on everything appertaining to the niceties of the French language, to grammar, rhetoric, and poetry, and the publication of the French classics. It distributes two annual prizes of 10,000 francs on the foundation of Count de Monthyon, one to the author of the best work on public morals, the other to the individual of the working classes who in the course of the year has performed the most virtuous action; an annual prize of 2,000 francs on the foundation of Baron Gobert, for the most eloquent work on the history of France; and every second year a present of 1,500 francs to a poor rising genius who needs encouragement. This last is a bequest of the marquis Maillé-Latour Landry. The *Académie des inscriptions et belles-lettres* consists of 40 members, 10 honorary academicians, and 8 foreign associates; it has 50 corresponding members at home and abroad. It meets once a week. Its concern is with general history, the condition of peoples, laws, and manners, religions and philosophical systems; the study of chronology and geography, medals, inscriptions, and monuments of all sorts; and comparative philology, and explanation of ancient documents. This academy bestows a yearly prize of 2,000 francs for the best memoir contributed to its transactions, and another yearly prize for numismatics. It superintends the publication of the following works: *Mémoires de l'académie des inscriptions et belles-lettres*, the collection of the papers which have been sent to it by learned investigators; *Collection de notices et extraits des manuscrits de la bibliothèque royale et autres bibliothèques publiques; Mémoires sur les antiquités de la France;* the continuation of the *Histoire littéraire de France* begun by the Benedictines of St. Maur; the *Collection des histoires de France;* the collection of the *Histoires des croisades orientales, grecques et latines;* edition of the *Ordonnances des rois de France*, also begun by the Benedictines; collection of the charters and documents relating to the history of France, the letters of the kings of France, and the catalogue of the charters. The conduct of the *Journal des savants* devolves chiefly upon this academy, although every member of all the academies can contribute. The *Académie des sciences* numbers 63 members, 8 foreign associates, and 100 corresponding members. It bestows an annual prize of 3,000 francs for productions on natural science; three yearly prizes on Monthyon's foundation, for statistics, mechanics, and experimental physiology; a prize of 10,000 francs, founded by Lalande, for the most important astronomical discovery or observation, and another by the widow of the astronomer Laplace, for the best scholar of the polytechnic school. Many other rewards are in its gift, for scientific and industrial inventions, discoveries, and improvements. This academy publishes three series of *Mémoires*, and, what is peculiar, holds its sessions in public, which are much frequented by the residents of Paris. The *Académie des beaux arts* consists of 40 members, 10 honorary academicians, and 10 foreign associates. It meets once a week. It superintends the competitive examinations for the yearly prizes, in reward of the best achievements in painting, sculpture, architecture, engraving in copper, and musical composition. It has its memoirs and transactions, and is busied in the discussion of the *Dictionnaire général des beaux arts.* The *Académie des sciences morales et politiques* numbers 50 members, 5 foreign associates, and 40 corresponding members. Its five sections are: philosophy; moral philosophy; legislation, public law, and jurisprudence; political economy and statistics; and general history and philosophy. The whole institute has one regular session in common, on the 2d of May of each year. By an imperial decree of April, 1855, an annual prize of 10,000 francs is placed by the government at the disposal of the institute, for the most useful invention of the last five years.—Academies also exist in many of the provincial cities of France, as at Soissons since 1675, Nîmes (1682), Angers (1685), Lyons (1700), Bordeaux (1703), Caen (1705), Marseilles (1726), Rouen (1736), Dijon (1740), Montauban (1744), Amiens (1750), Toulouse (the first volume of whose transactions is dated 1782), and so on. There was also at Paris the *Académie celtique*, founded in 1807, for the elucidation of the history, customs, antiquities, manners, and monuments of the Celts, particularly in France; also for philological researches by means of the Breton, Welsh, and Erse dialects, and for investigation into Druidism. This is now merged in the *Société des antiquaires de France*, and has published several volumes of interesting memoirs. The French Opéra is styled the *Académie de musique.* **III. Spanish Academies.** A society for the cultivation of physical science, called the *Academia Naturæ Curiosorum*, was established at Madrid in 1652, on the model of the Neapolitan *Academia Secretorum Naturæ*, before described. Of those now existing, three are specially noteworthy, viz.: 1. The royal academy at Madrid, founded in 1714, on the model of the *Della Crusca* and the *Académie française.* It published the first edition of its dictionary in 1726–'39. 2. The royal academy of Spanish history. This commenced as a private association at Madrid, but was taken under royal protection in 1738. 3. The academy of painting and sculpture, at Madrid, dates from 1753. An academy of sciences was founded in 1847. **IV. Portuguese Academies.** An academy of Portuguese history was established at Lisbon in 1720, by King John V. A still more flourishing though more recent institution is the academy of science, agriculture, arts, commerce, and general economy, founded by Queen Maria in 1779. It is liberally endowed by the state, and is divided into three sections: 1, natural science; 2, mathematics; 3, Portuguese literature. The geographical academy at Lisbon has published a map of Portugal since the beginning of this century. **V. German Academies.** The royal academy of sciences and belles-lettres at Berlin was founded in 1700, by the elector Frederick, partly on the model of the royal society of England, but not opened till 1711. Leibnitz was its first president. In 1744 Frederick the Great gave it a new organization; the king invited to Berlin many distinguished foreigners, and placed Maupertuis at the head of the institution. Formerly the transactions were published in French, but since the revolution they have appeared in German. A yearly medal worth 50 Prussian ducats is distributed. The other noteworthy German associations of the kind are the academies of Göttingen (founded in 1750), Munich (1759), Leipsic (1846), and Vienna (1846), chiefly devoted to historical studies and general scholarship. Prague, Cracow, and Pesth also possess creditable academies. **VI.** In Switzerland, there is an academy of medicine at Geneva, founded in 1715. **VII.** In Belgium, the academy of sciences and belles-lettres at Brussels was founded by Maria Theresa in 1772, suspended during the French revolution, revived in 1816, and reorganized in 1845 as the *Académie royale des sciences, des lettres et des beaux arts.* **VIII. Holland.** The *Academia Lugduno-Batava*, at Leyden, was founded June 18, 1766, and publishes *Annales.* The academy of Amsterdam, founded in 1808, was devoted to fine arts only, but was converted in 1852 into an academy of sciences, literature, and fine arts. Rotterdam, Haarlem, Utrecht, and Middelburg have also learned associations. **IX. Scandinavian Academies.** The royal academy of sciences at Stockholm was instituted by six men of science, among whom was Linnæus. Their first meeting was on June 2, 1739; in that year the first volume of memoirs appeared. On March 31, 1741, they were incorporated under the name of the royal Swedish academy. It is not supported by public patronage like the academies of France, Spain, Italy, and Germany. It has, however, a large fund, the fruit of legacies by private individuals. The transactions are written in the Swedish language, but have also been translated into German. Annual premiums for the encouragement of agriculture and inland trade are distributed by the academy. The prize fund is indebted for its existence to voluntary contributions. Stockholm contains also an academy of belles-lettres, established in 1753; and the literary academy of Sweden, founded in 1786, whose object is the cultivation of the national language. There is an academy of northern antiquities at Upsal, whose researches have done much toward elucidating the early condition and creeds of the Gothic race. The royal academy of sciences at Copenhagen owes its origin to six individuals. The count of Holstein was its first president, and the king of Denmark extended to it his patronage in 1743. It has published 15 volumes in the Danish language, which have been in part translated into Latin. The academy of the fine arts was established in 1733 at Stockholm, by the exertions of Charles Gustavus, count of Tessin; and that of Copenhagen, founded in 1738, was incorporated in 1754. **X. Russian Academies.** The imperial academy of sciences at St. Petersburg was projected by Peter the Great. He took the advice of Wolf and Leibnitz. Learned foreigners were invited to become members. The death of Peter left the execution of this project to his successor, Catharine I. The academy held its first sessions in December, 1725. A large annual sum was appropriated for the support of the members. The most distinguished of the professors were Bulfinger, a German naturalist, Nicolas and Daniel Bernoulli, Wolf, and the two De Lisles. The academy suffered many vicissitudes until the accession of the empress Elizabeth in 1741, when new life was infused into it. The first transactions of this academy were published in 1728, and entitled *Commentarii Academiæ Scientiarum Imperialis Petropolitanæ ad Annum* 1726, with a dedication to Peter II. Until 1777 the papers were published in the Latin language only; they are now written sometimes in French and sometimes in German. Several volumes are published every year. Each professor has a house and an annual stipend of from $1,000 to $3,000. The celebrated mathematician Euler contributed largely to the mathematical papers of this body. In 1783 an institution on the model of the *Académie française* was established at St. Petersburg, for the cultivation of the national language, but it was soon amalgamated with the imperial academy. The *Académie impériale des beaux arts* of St. Petersburg was founded in 1765 by Catharine II., who endowed it richly. It now sends out pupils to Germany and Italy for education in the fine arts, and supports them during their studies. Mr. Albert Bierstadt, chosen in 1871, was the first American honorary member of this academy. **XI. British and Irish Academies.** In Britain proper, the term society or association is the designation in use for bodies of learned men united in pursuit of some common object. They will be found enumerated under the head of SOCIETIES. The word academy in Britain is reserved for institutions devoted to the cultivation of the fine arts. In Ireland the continental name has been adopted. The royal Irish academy, founded in 1782, at Dublin, has published transactions from time to time since 1788. The present royal academy of arts in London originated in a society of painters, who obtained a charter in 1765, under the title of the "Incorporated Society of Artists of Great Britain." This society took a new form in 1768, and became the royal academy of arts. It consists of 40 artists, bearing the title of royal academicians, of 18 associates, 6 associate engravers, and 3 or 4 honorary members. There is an annual exhibition of paintings, sculptures, and designs, open to all artists. This exhibition is so well frequented that the royal academy draws almost all its funds from the money paid by the public for tickets of entry. The Edinburgh royal academy of painting was founded in 1754. A similar institution, called the royal Hibernian academy, was established in Dublin about 1832. An academy of ancient music was established in London so early as the year 1710; but a disagreement among its members finally broke it up. Soon afterward the royal academy of music was formed for the performance of operas composed by Handel. Another disagreement broke this up in 1729. The present royal academy of music was established in 1822. It is of great utility as a school of vocal and instrumental music. **XII. Turkish Empire.** The academy established in 1851 at Constantinople is still feeble. That founded at Alexandria in 1859 has published memoirs and bulletins since 1862. **XIII.** The principal Australian academy is located at Victoria. **XIV. Asia.** There are learned associations in all the important British colonies of Asia, and an academy at Batavia (Java), devoted to sciences. **XV. American Academies.** In America, as in Britain, the term academy is not generally used for learned societies. The American academy of arts and sciences, at Boston, founded in 1780, has published several volumes of transactions. The Connecticut academy of arts and sciences was founded in 1799. The academy of natural science, at Philadelphia, founded in 1818, is a flourishing institution, and has splendid collections of fossils, stuffed animals, birds, and Dr. Morton's collection of skulls, the finest on the American continent. The national academy of sciences was incorporated by congress March 3, 1863. It is provided that "the academy shall consist of not more than 50 ordinary members, shall have power to make its own organization, including its constitution, by-laws, and rules and regulations; to provide for the election of foreign and domestic members, the division into classes, and all other matters needful or useful in such institution, and to report the same to congress." Fifty members were named in the original act, a majority of whom met for organization in New York, April 22, 1863. The academy receives no support from the government, and, being destitute of funds beyond a legacy left by the late Alexander Dallas Bache, is not in condition to publish its proceedings; hence the public hear very little of its activity. The Pennsylvania academy of fine arts, established in 1807, holds annual exhibitions at Philadelphia. The national academy of design, at New York, was founded in 1828, chiefly by the exertions of Mr. S. F. B. Morse, its first president. It is composed exclusively of artists, has one of the most conspicuous buildings in the city, maintains a flourishing school of design, and has annual exhibitions. The medical academy of New York is in a flourishing condition; its meetings are well attended, and attract much public interest. New York, following the Parisian example, called her principal opera house the academy of music. This spacious building, erected by an incorporated society, and capable of containing 4,500 persons, was opened in the autumn of 1854; it was burned in 1867, and replaced by one of considerably smaller dimensions. Philadelphia followed with a similar construction for similar purposes; it was inaugurated as the American academy of music in the winter of 1856–'7. Other opera houses with the same designation have since been erected in Brooklyn, Chicago (burned in 1871), and other cities. **XVI.** At Rio Janeiro and in other South American capitals are also academies of learning and of fine arts.

ACADIA, or **Acadie,** the name of the peninsula now called Nova Scotia, from its first settlement by the French in 1604 till its final cession to the English in 1713. In the original commission of the king of France, New Brunswick and a part of Maine were included in Cadie, but practically the colony was restricted to the peninsula. The English claimed the territory by right of discovery. In 1621 it was granted by royal charter under the name of Nova Scotia, and its possession was obstinately disputed. (See NOVA SCOTIA.) The quarrels between the two nations were embittered by the desire for exclusive possession of the fisheries. After the final cession the Acadians generally remained in Nova Scotia, though they had the privilege of leaving within two years, and, refusing to take the oath of allegiance, took the oath of fidelity to the British king. They were exempted from bearing arms against their countrymen, whence they were known in the colonies as the neutral French. They were allowed to enjoy their religion, and to have magistrates of their own selection. The French, having lost Acadia, settled the island of Cape Breton and built Louisburg. There they carried on intrigues with the Indians, who kept up an irregular warfare with the English, the blame whereof was thrown upon the neutral French, who in 1755, a few years after the English turned their attention to the colonization of Nova Scotia, suffered for the offences of their countrymen, of which they were doubtless innocent, since they were a simple agricultural people. Because they still refused to take the oath of allegiance, or to bear arms against the French or their Indian allies, to whom they were suspected of lending aid, and because by their peculiar position they embarrassed the local government, it was determined at a consultation of the governor and his council to remove this whole people, 18,000 souls, and disperse them among the other British provinces. For this harsh measure itself there may have been some excuse; for the manner in which it was carried out there was none. The inhabitants were compelled to give up all their property, their houses and crops were burned before their eyes, and themselves shipped in such haste that few families or friends remained together. In a few towns the Acadians discovered and escaped the plot, but most of them were scattered over the continent.

ACALEPHÆ (Gr. *ακαληφη*, nettle), a class of animals living in sea water, some species of which possess the nettle-like property of irritating and inflaming the skin. The animals are invertebrate, gelatinous, of circular form, often shaped like an umbrella, and all included in the division of *radiata*. (See JELLY FISH.)

ACANTHUS. Under this name have been described by the classical writers three different plants: 1. A prickly tree, with smooth evergreen leaves and saffron-colored berries, believed to be the common holly. 2. A prickly Egyptian tree, with a pod like a bean, supposed to be the *acacia Arabica*, or gum arabic tree. 3. An herb with broad prickly leaves, which dies in the winter, but shoots out afresh in the spring. The idea of the beautiful Corinthian capitals of the Greek columns is said to have been derived from a basket filled with the roots of this plant, set down carelessly by a girl, and covered with a tile; when the leaves, forcing their way through the crevices, and rising toward the light, until met by the under side of the cover, presented the effect of the foliage and volutes simulated by the Grecian chisel. In modern botany acanthus is a genus of herbaceous plants found in the south of Europe, Asia Minor, and India, the commonest species of which is the *acanthus mollis*, a native of moist, shady places in the south of Europe. It has pretty foliage and large white flowers tinged with pale yellow. This was long supposed to be the classic plant of antiquity; but it has been shown that it does not exist either in the Peloponnesus or in the isles of Greece, and the honor of having furnished the idea of the Corinthian capital is now attributed to the *acanthus spinosus*, which has deeply cleft prickly leaves, and flowers tinged with pink instead of yellow. In England they are both half-hardy perennials, needing protection from frost, and propagated by subdivision of the roots. In America they would probably endure the winter south of Maryland; northward they would be greenhouse plants.—The word acanthus also signifies thorn, as in *acanthopterygious*, thorny-finned, applied to an order of fishes.

Acanthus mollis.

ACAPULCO, a seaport town of Mexico, on the Pacific, in the state of Guerrero, 180 m. S. by W. of Mexico; lat. 16° 50′ N., lon. 99° 48 W.; pop. about 4,000. It has one of the best harbors on the W. coast, and during the Spanish dominion in Mexico was the focus of the trade from China and the East Indies, and a place of considerable importance. It has since relapsed into insignificance, although previous to the opening of the Pacific railroad the California trade imbued it with a transitory commercial life, in consequence of its having been made the coaling station for the steamers between Panama and San Francisco.

ACARNANIA, a province of ancient Greece, bounded N. by the Ambracian gulf and Amphilochia, which is by some included in Acarnania, E. by Ætolia, and S. W. and W. by the Ionian sea. It is mountainous, with numerous lakes and tracts of pasture, and its hills are still well wooded. Among its earliest inhabitants were Leleges, Curetes, and colonists from Argos. The Acarnanians were more akin in character and manners to their savage neighbors of Epirus than to the Greeks proper. Up to the time of the Peloponnesian war they were a race of shepherds, continually fighting, but faithful and steadfast. They also figure as pirates. Though possessing several good harbors, the Acarnanians paid little attention to commercial pursuits.—At the present day it forms with Ætolia a nomarchy or province of the kingdom of Greece; area, 3,024 sq. m.; pop. in 1870, 121,693. The country is thinly inhabited, and little cultivated, notwithstanding its fertile soil and treasures of sulphur and coal. Besides the Greek population, there are bands of nomadic Kutzo-Wallachs, here called Karagunis (black cloaks), who in the winter descend from the northern mountains of Agraphi and encamp with their herds at the edge of the woods. They speak a dialect akin to the Latin. Different from them are the nomadic Sarakatzanes, who are of Greek origin. A band of the Karagunis embraces from 50 to 100 families, constituting a *stani*, and is commanded by the most wealthy member as chief (*tchelinga*), who farms the pastures and fixes the time of departure. They are skilled in making cotton goods. Capital, Missolonghi.

ACARUS, the name of a genus of insects, commonly called mites. They belong to the spider family. They are all extremely minute, and mostly microscopic insects. Some are parasitic, as the itch insect, *acarus scabiei*. The different species infest brown sugars, meal, cheese, &c. To collections of insects and stuffed birds they do much injury. Camphor tends to keep them off, and corrosive sublimate is a still more effectual protection. (See EPIZOA, and ITCH.)

ACASTUS, in mythology, son of Pelias, king of Iolcus. He took part in the Calydonian hunt and the expedition of the Argonauts. He revenged the murder of his father, in which his sisters were the instruments of Medea, by driving Jason and Medea out of Iolcus, and instituted funeral games in honor of Pelias.

ACCAD, one of the four cities in the "land of Shinar" or Babylonia, which, according to Gen. x. 10, were the beginning of Nimrod's kingdom. Among other places, it has been identified with Nisibis. Rawlinson sees in Accad the name of "the great primitive Hamite race" in Babylonia.

ACCELERATION, an increase in velocity of a moving body, either constant and uniform or variable. When the velocity receives equal increments in equal times, it is uniform. This is the case with bodies falling in a vacuum, the increase of which is in every second about 32⅙ feet, but varies with the latitude of the place and the height above the ocean, or the depth under the surface of the earth. As gravitation is the cause of this acceleration, scientists have accepted the letter *g* for it as a symbol, meaning 31 or 32 or any other number of feet, as the case may be. At the distance of the moon the acceleration is 3,600 times smaller, and *g* is thus equal to about ⅑ inch; while at the surface of the sun and large planets it is much greater by reason of the greater attraction of large masses. Acceleration is variable when its velocity increases at one instant in a greater or lesser ratio than in another. This is the case with a body falling from a great height toward the earth through the air; the resistance of the latter increasing with the velocity, the ratio of increase must diminish till the accelerating force, that is, gravitation (*g*), balances the resistance of the air, when the body will continue to fall with uniform motion, which motion may then become retarded if the body in its downward course enters strata of air of greater density and thus at greater resistance. The motions of the planets, and especially of the comets, in their orbits around the sun, offer other illustrations of variable acceleration.—**Acceleration of the Moon.** Halley noticed that the comparison of ancient eclipses with modern shows that the moon moves faster now than formerly, and the solution of the problem as to the cause of this acceleration was first given by Laplace, who showed that the slow diminution of the eccentricity of the earth's orbit must produce an acceleration of the moon's motion and a decrease in the period of its revolution. Adams has recently shown that Laplace overestimated the effect of the change of the earth's orbit on the moon by one half, and that his demonstration therefore only accounts for half of the moon's acceleration. The cause of the other half remains to be found out. Delauny ascribes it to a retardation in the earth's motion of rotation by the influence of the tidal wave raised by the moon, and reacting on the latter. The earth's daily rotation, however, appears to undergo neither acceleration nor retardation; therefore others ascribe it to a resisting medium, filling the interplanetary space and revolving round the sun with the planets, and which thus only can affect their moons, which at every half revolution move in opposite direction to the general motion, and thus having their centrifugal force checked are drawn nearer to the planet, by which their apparent or angular velocity is increased.—**Acceleration of the Stars.** The so-called stellar acceleration is no acceleration in the true sense, but means only the amount that the apparent daily revolution of the stars gains on that of the sun. It is easily calculated by considering the fact that the starry heavens make per year one revolution more than the sun; therefore the daily gain must be $\frac{1}{365}$ part of 24 hours, which is very near 3 minutes and 56 seconds.

ACCEPTANCE, an agreement to pay a bill when due according to the tenor of the obligation assumed. A bill of exchange or draft is a written instrument by which A requests B to pay C a sum of money at a certain time, unconditionally. A is the drawer, C the payee, and B the drawee; and if B assents to the request, or in other words accepts the bill, he is the acceptor, and his agreement is the acceptance. The bill is usually drawn on the drawee B because he has funds of A in his hands, or is indebted to him to the amount covered by the bill. But the bill does not ordinarily of itself work an assignment of the fund or the debt so that C can claim that specifically of B. An order drawn on B for the payment to C of any particular fund amounts to an assignment of that fund, and B is bound by mere notice of the order to make the payment, and his acceptance or assent to the arrangement is not essential. But a bill of exchange is not an assignment of nor an order on any special fund, but is intended to raise a contract by the drawee which he may satisfy out of any money which he has. This contract, however, does not arise, and the drawee owes no duty to the payee of the bill, until he accepts it. It is therefore the duty of the holder to present the bill for acceptance. This is fairly implied from the form of the instrument; and if the acceptor is not called upon, as the bill directs that he shall be, and then fails, the drawer will be discharged. In some countries, as for example in France, acceptance must be demanded within limits defined by positive laws. But by our law, though there is no fixed time prescribed within which the presentation for acceptance must be made, it ought obviously to be within a reasonable time, considering all the circumstances. What is or is not such a reasonable time is a question of law, and depends, for example, upon the character of the bill, whether payable a certain time after sight, or at a precise date, or whether domestic or foreign; upon the place where it is drawn regarded in connection with the place on which it is drawn; or upon the legitimate commercial negotiation or use which may be made of the bill. If the bill is payable at sight, or so many days or months after sight or after demand, the presentation is necessary in order to fix the time of payment, and it ought to be made with diligence; though if it is payable at a fixed period after its date, or at a day certain, the holder need not offer it for acceptance until its maturity. Again, what is reasonable time for presentation in the case of a bill drawn in Boston on New York would not be reasonable time in case of one drawn in New York on Calcutta. So delay to present the bill may be excused when an inevitable accident prevents the holder from doing it, such as his illness, or the outbreak of a war which forbids commercial intercourse. The usual course of negotiation of the bill may also justifiably delay its presentation for acceptance, so that what would be reasonable time in the case of a negotiated bill would be unreasonable in the case of one which had never been yet transferred. The principle of the rules respecting presentation for acceptance being that the drawer and other parties may be injured by delaying it, an entire omission to present the bill to the acceptor may be excused when it appears that the drawer had no funds in his hands and had no right to suppose that he had, or when for any other reason it is certain that the omission was not prejudicial to the drawer or other parties. In certain cases no acceptance and therefore no presentation is necessary to charge the drawee; as where a bill is drawn by a person upon himself, or by a partner upon his firm, or by one officer of a corporation on another officer of it or on the corporation itself.—When the bill is addressed to the drawee at a particular place, the demand for acceptance should be made at that place; and if the drawee, though not at the very place named, is within the same town, and perhaps within the same state, he should be sought out. But if he never lived in the place named, or has removed to a distant place, especially if it is out of the state, or his house is shut up and no one is there to answer for him, presentation is excused and the bill may be treated as dishonored. When the bill is drawn on a firm, it is enough to present it to one of the partners. If the presentation is required by the bill to be made at a bank, it must be made within the usual bank hours; or if at the drawee's place of business, then within the usual hours of business; but if it is to be made at his home, it may be made within any reasonable hours of the day; and in all cases the drawee is entitled to have possession of the bill for a day if he require it, in order to decide, on examining his accounts with the drawer, whether to accept or not. —The acceptance may be absolute or qualified or conditional, though the holder is not bound to receive anything but an absolute acceptance. It may be written, or, if no statute interferes, it may be oral. It may be before the drawing of the bill or after it is drawn, or even after its maturity; and it may be by the drawee, or by some one else, for honor of the drawer or other parties to the paper. But the acceptance is usually absolute, in writing, and on the bill itself; and any form is sufficient which indicates the purpose of the drawee to honor the draft. The usual forms are, "Accepted" or "Honored," or the mere signature of the acceptor written across the face of the bill. In New York, by special statute, the holder may require that the acceptance be written on the bill, and a refusal to comply with such request may be regarded as a refusal to accept, and the bill may be protested for non-acceptance. By the same statute, if the drawee receives the bill and then destroys it, or refuses to return it within 24 hours, accepted or not accepted, he is deemed to have accepted it. This is only a positive enactment of a rule, the principle at least of which is pretty firmly established in the general commercial law. For, though the detention of a bill is not essentially an acceptance of it, yet when it takes place under such circumstances as fairly justify the holder in supposing that an acceptance is intended, or if any other construction of the drawee's act would prejudice the holder without any fault on his part, it is fair enough to fix upon the former the same liability which he would have incurred by an actual acceptance.—The acceptance may be qualified or conditional; as for a part of the amount which the draft calls for; or to pay at a different time or place, or in a different manner from that required; or when the drawee is in funds, or when certain goods in his hands are sold. If the holder accepts any of these variations from the tenor of the bill, he is bound by them. But, as already said, he cannot safely assent to them if they are at all substantial variations, unless he has the consent of the other parties; for their liability is founded on the very terms of the instrument, and they are not bound by any new conditions which the acceptor may propose, unless they expressly agree to them.—The acceptance need not be in writing unless positive statutes require it. But for the purpose of preventing the inconveniences which result from an opposite rule, there are in many of the states positive statutes to that effect, and the best illustration of them is furnished by the statute of New York. It is provided there that no person shall be charged as an acceptor on a bill unless his acceptance is in writing and signed by himself or his lawful agent. But it is also provided for the benefit of a drawer, that this and the other provisions of the act shall not impair any of his rights against a drawee, on the faith of whose promise to accept the bill the drawer drew and negotiated it. By the same statute it is declared, as indeed it is well established by the general commercial law, that any unconditional promise in writing to accept a bill, though made before it is drawn, amounts to an actual acceptance of the bill in favor of any person who took the bill for valuable consideration on the faith of such promise in writing. Neither of these last rules of the statute, it will be seen, takes away or affects at all a drawer's undoubted right to damages against a drawee for breach of an agreement, made on good consideration with the drawer, to accept his bills. Under the last cited provision of the statute it has been held in New York that an unqualified authority in writing or by telegraph to draw on one is equivalent to his unconditional promise to accept the bill drawn; and that a letter of credit which confers an absolute authority on the holder to draw bills upon the author of the letter is also an unconditional promise in writing to accept the bills drawn, within the same section of the statute; and in both cases the liability is enforced in favor of the persons who took the bills on the faith of the written authority. With the qualification, perhaps necessary, that the written promise to accept, or authority to draw be given within a reasonable time before or after the date of the bill, or contemplate or in some way fairly include the bills actually drawn, the rule or principle just stated is the general rule of the law.—If the original drawee refuses to accept or cannot be found, and the bill has been duly protested, any other person may accept for honor, or, as it is sometimes said, *supra* protest. It may be for the honor of the drawer or an indorser, or for the honor of the bill generally; and if it is intended to be for the benefit of any one especially, the acceptance ought to point him out. It is a conditional agreement by a volunteer to pay the bill at maturity if the original drawee does not. When one has paid a bill for the honor of the drawer, for example, he may recover against him after proving presentation to the original drawee, non-acceptance or non-payment by him, and notice to the drawer; in short, by doing just what the payee must have done to sustain an action. This rule of the commercial law is well established, though it is utterly anomalous, and forms perhaps the only exception to the principle that no one can make another his debtor without his consent. The holder of a bill is of course not bound to receive such an acceptance; but if he does, he is bound to conform to the new condition of things, so that in order to hold the acceptor for honor he must call on the original drawee before applying to him; and if he wishes to hold the drawee or other party, to whose benefit the acceptance for honor accrues in case of non-payment by the acceptor for honor, he must not only call on the original drawee, but also on the acceptor for honor, protest in both cases, and notify the prior parties.—Every acceptance admits the signature of the drawer; so that an acceptor is liable to an innocent holder for value even though the drawer's signature is forged. So also the acceptor admits the authority of one who has drawn as the agent of another.—In case of non-acceptance of a bill, the holder is bound to give notice of the fact to the drawer or indorsers if he wishes to hold them. Mere failure to notify them will not be fatal to the holder's action against them, if he can show that they have sustained no injury from his omission; but the presumption of injury is in their favor, and the burden of proof is on him to overset it. The mere fact that the drawer had no funds in the hands of the drawee is probably not sufficient excuse for failure to give him notice of the dishonor of the paper. Perhaps he ought to have had funds if the drawee had kept his account properly, or at all events he may be prejudiced in some way by want of notice, and it is not safe to assume anything against his right to have it, in case of non-acceptance. Foreign bills should be protested in full form. It is customary to protest as to inland bills also, but it is not necessary, unless positive statutes require it. Indeed, where they do not require or authorize it, protest of inland bills is an empty form, of no use whatever.

ACCESSORY, properly, with reference to a felony, one who takes part in the act, but not such part as to be a principal. The law recognizes no accessory in treason, the highest of crimes, nor in misdemeanors, the lowest class of offences; in the former case, because the crime is so great that it will hold all participants equally guilty; and in the latter case, because the crime is comparatively so small that it will not trouble itself to distinguish between the degrees of guilt. In offences of these degrees all are principals. Accessories are familiarly designated as those before the fact and those after the fact. An accessory before the fact is one who participates in the very criminal act of the principal; but an accessory after the fact is guilty of a crime of his own, which is independent of that of the principal, and in which the latter properly has no share. To call him an accessory, therefore, is not quite accurate; at least the word has not the same propriety of meaning that it has when applied to the accessory before the fact. But the description is fixed in the law and cannot be disturbed.—When a crime is committed, he who actually does the specified act is the principal, and, as it is said sometimes, he is the principal in the first degree; and he who is present, and aids and abets the principal in doing the act, is called the principal in the second degree. But he who, though not present at the commission of the act of the principal, yet commands, counsels, or procures it to be done by him, is an accessory before the fact. Here absence is essential; for the same act of instigation and procurement, if done in the presence of the actual offender, and at his perpetration of the offence, would make the participant a principal. Thus in the case of a murder, those who are present, and intelligently aid and abet the killing, are all principals. But if two men meet in the presence of others and fall to blows, and either have a deliberate, malicious intent to kill the other, but the by-standers, being ignorant of this, aid and abet the fighting merely, they are not guilty of murder if one be killed. But again, as to presence, there may be a constructive presence as well as an actual presence; so that mere physical absence from the scene of the offence will not necessarily save the participant from the guilt of a principal and make him a mere accessory. Thus he is a principal who conspires with a murderer for the doing of the act, but stands at a distance and is absent from it in order to watch against surprise or discovery, or to prevent the escape of the victim. But if A simply command B to beat C, and he does beat him so that he dies, B is the principal in the murder and A is the accessory before the fact. If A, however, command B to commit a certain crime, and B, of his own will and design, commit a different one, A is not an accessory to the offence committed, because he is not guilty of setting in motion the criminal intent which executed the act. But it will be otherwise if B, in attempting to execute A's design, execute it on the wrong person; for in that case A is guilty of setting in motion the very criminal intent which resulted in the crime actually committed.—In an old phrase of the law the accessory is said to attend and follow the principal, as the shadow does the substance; and at common law, and where no statutes have intervened to change the rules on this subject, the accessory cannot be guilty of any other, and at all events of no higher offence than his principal; nor is he guilty at all if his principal is not guilty; if the principal is acquitted, so is the accessory; he cannot be convicted, except jointly with the principal, or after his conviction; and formerly, and until a remedial statute to the contrary, if after conviction of the principal sentence upon him was stayed for any reason, the accessory could not be held. But recent statutes in England and in almost all of the United States have very materially changed the law in these respects. For example, the statutes of Massachusetts and New York provide that any person who, by counselling, hiring, or otherwise procuring the commission of a felony, becomes an accessory before the fact, shall be punished in the same manner as the principal felon. In New York it is also provided that the accessory before or after the fact may be indicted, tried, convicted, and punished, notwithstanding that the principal felon has been pardoned or otherwise discharged before conviction; and in Massachusetts, if for any reason the principal is not amenable to justice. In that state, too, the aider and abettor, who at common law would have been but a mere accessory, may be indicted and convicted of a substantive felony, without any regard to the indictment or conviction of the principal. There are similar statutory provisions in Pennsylvania; and, indeed, probably all the states have statutes of the same character.—An accessory after the fact is one who, knowing the guilt of the felon, whether principal or accessory before the fact, receives or assists him, but, it should probably be added, with intent to hinder his trial, conviction, or punishment;

as, for example, by concealing him or shutting out the officers of the law, or resisting them, or attempting to take him or rescuing him from their custody, or providing him with money or other means of flight, or bribing a jailer to permit his escape from prison. But merely suffering the felon to escape, or simply ministering to his physical necessities, will not make one an accessory after the fact. At common law the guilt of assisting the felon in these unlawful ways was not excused even to those of his own family, so that a father might not thus protect his son, nor the son his father, nor a brother his brother, nor a husband his wife. The single exception was in favor of the wife who sought thus to save her husband, and probably this was on the ground, in part at least, that she was supposed to be under the control of her husband, and to have no choice to do otherwise. But in this respect the modern statutory law has interposed benignantly. In Massachusetts, for example, it exempts those who stand in the relation of parent or grandparent, child or grandchild, brother or sister to the offender; and there are similar statutes in other states.

ACCLIMATION, or **Acclimatization,** the process by which an individual or a species, on being removed to a different climate, becomes modified in constitution and adapted to the changed conditions. The two words, however, are not strictly synonymous. Acclimation is generally used in speaking of particular individuals, and more especially of those belonging to the human species, and refers to the alterations which the system undergoes spontaneously in a foreign climate, by which it at last becomes no longer subject to the maladies peculiar to new-comers. Acclimatization, on the contrary, expresses the artificial care by which man succeeds in naturalizing, under his own supervision, a species of animals or vegetables of exotic origin. —**Acclimation.** Man inhabits all the zones and nearly every region of the earth, and has been enabled in repeated migrations to change the place of his habitation and to occupy new countries. The human species is therefore regarded as cosmopolitan; and yet two facts are important to notice in this respect: First, most of the great migrations, historic or traditional, have been made in the direction of longitude and not in that of latitude; the migrating tribes instinctively or intentionally keeping nearly within the same parallels of latitude, and consequently not suffering very great alterations of temperature, nor meeting in their new homes with a flora and fauna very dissimilar to those of their native country. Secondly, at the present day, although an individual may migrate either westward or eastward, as a general rule, without suffering from the change, a removal into a different latitude is almost always accompanied with peculiar dangers during the first few years of his residence in the new locality. The most marked instance of this kind is when a person from the temperate zone visits for the first time a tropical or sub-tropical region. The dangers that first beset him are fevers, which are so marked in type and so ready to attack newly arrived immigrants, that they are sometimes called the "strangers' fever." The yellow fever of the West Indies and the southern United States, and the coast fever of western Africa, are well known examples of these affections. They are not absolutely restricted to new-comers, the natives being also subject to them; but the recent immigrant is so much more likely to be affected, and is attacked by the disease in so much larger proportion, it is evident that his system has in it something which offers a peculiar attraction for the febrile poison, and which does not exist, at least to the same extent, in that of the native or the old resident. After passing through a period of general ill health and debility, extending over some years, and perhaps one or more severe attacks of illness, the immigrant approximates in his appearance and habit of body to the older denizens of the place, and is no longer peculiarly liable to the disorders which affected him on his arrival. He is then said to be acclimated. No doubt, part of the immunity enjoyed by old settlers in a tropical or sub-tropical climate is due to the fact that they have learned prudence in regard to exposure, and have come to regulate habitually their mode of life to correspond with the climate of the country. Recent immigrants often neglect these essential precautions, because they have not found them necessary in a temperate climate; and it is only after repeated experience of their value that they come to adopt them habitually and as a constant protection.—**Acclimatization.** Many of the useful animals and plants have been successfully transferred from their original locality and made to thrive in new and unaccustomed places. The horse, the ass, the ox, the sheep, the goat, and the cat have accompanied man nearly everywhere within the temperate and tropical regions, and the dog is his companion even within the arctic circle. This fact has given rise to the hope that acclimatization might be successfully extended to still other species, and the *société d'acclimatation* at Paris has been established with a view of experimental investigation in this direction. Their endeavors have in many instances proved successful, at least in so far that tropical animals are found, when well cared for, to support the cold of a European winter without injury or even inconvenience. The zebra from Africa may be seen quietly resting upon the snow, and the tapir from Guiana swimming for his amusement in the stream which runs through his enclosure, when the temperature of the water is hardly above the freezing point. This, however, by no means indicates a completely successful acclimatization. It is successful so far as the individual is concerned; but acclimatization means the survival and prosperity of the species. In order to secure this result, the animals which have been imported must themselves thrive and reach their usual term of existence, and produce offspring; the parent must willingly take the natural care of her young; the young animals must themselves have sufficient vigor to arrive at maturity and again reproduce their kind. Either one of these conditions may fail, and in certain instances have done so, notwithstanding that all the preceding ones had fully succeeded. Finally, in order that acclimatization may be in any case practically useful, the animals of the naturalized species must, in addition, be able in their new habitation to bear the labors or produce the material for the sake of which man has taken them under his care. Plants may be acclimatized to a certain extent, and if slowly accustomed to a change of climate, and well cared for, they will in their offspring undergo changes which will fit them for the new conditions under which they live. Experiments in this direction have in some instances met with unexpected success; and on the ground of this, societies have been formed in some of the principal European cities to accomplish the acclimatization of sub-tropical and some tropical plants to their latitude, and also of those belonging to colder regions.

ACCOLTI, Benedetto, an Italian lawyer, born at Arezzo in 1415, died in 1466. He became secretary of the Florentine republic in 1459. He is said to have had so fine a memory that, having heard an ambassador of Hungary deliver a Latin speech before the senate of Florence, he repeated it afterward, word for word. He wrote a work on the first crusade, from which Tasso drew the materials for his *Gerusalemme liberata*.

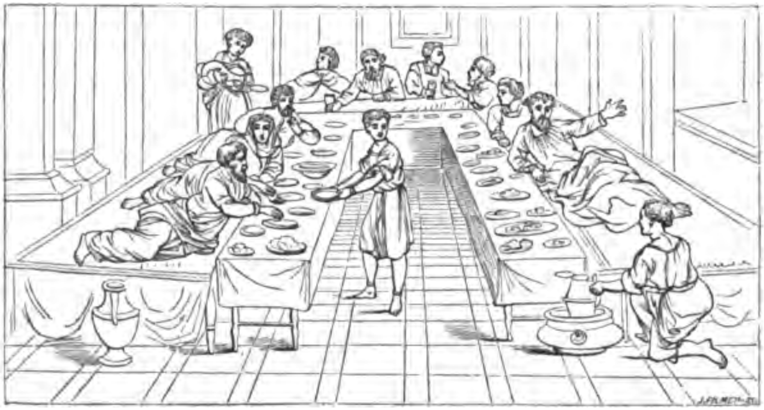
ACCOMACK, an E. county of Virginia, bordering on Maryland, and forming with Northampton county, from which it was set off in 1672, the peninsula on the E. side of Chesapeake bay; area, 480 sq. m.; pop. in 1870, 20,409, of whom 7,842 were colored. The surface is level and the soil light and moderately fertile. In 1870 the productions were 580,560 bushels of corn, 336,860 of oats, 97,730 of Irish and 212,507 of sweet potatoes, 7,991 lbs. of wool, and 40,284 of butter. Capital, Accomack Court House, or Drummond Town.

ACCORDION, a musical instrument, invented by Damian at Vienna in 1829, the sounds of which are produced by the action of the wind from bellows upon metallic reeds. It is played altogether by the hands, in which it is held.

ACCRA, a country in western Africa, on the Gold Coast, over which England and Denmark exercise jurisdiction. The British division consists of Fort St. James, in lat. 5° 32′ N., lon. 0° 12′ W., and a very small territory, with a negro population of about 3,000. Crèvecœur, situated about one mile E. of Fort St. James, is an ancient Dutch settlement, which was destroyed by the English in 1782, partially rebuilt in 1839, and ceded to England in 1872. Accra is said to be one of the most salubrious localities on the coast.

ACCRINGTON, a town of Lancashire, England, 19 m. N. of Manchester, divided into Old and New, the latter the larger and of recent growth; pop. in 1861, 19,688; in 1851, 9,747. It is situated in a deep valley, is the centre of the Manchester cotton-printing business, and has besides several cotton factories, dyeing, bleaching, and chemical works, and coal mines. The streets are well paved and lighted.

ACCUBATION, a table posture, between sitting and lying, invented by the Greeks and adopted by the Romans and Jews. About the low dining table were placed two or three long couches, furnished with more or less sumptuous draperies, on each of which lay usually three persons, on their left side, resting either their heads or elbows upon pillows, the feet of the first being behind the back of the second, and those of the second behind that of the third. The middle place was considered the most honorable. Though this posture was at first considered immodest for Roman ladies, they soon indulged in it; but it was never permitted to children or persons of mean condition.



Accubation.

ACCUM, Friedrich, a German chemist, born in Bückeburg, March 29, 1769, died in Berlin, June 28, 1838. In 1793 he went to London, where he was appointed in 1801 professor of chemistry and mineralogy in the Surrey institute. Being accused of purloining books and engravings from the library of the royal institution, he returned to Germany, and in 1822 was appointed professor in the school of industry and the academy of architecture in Berlin. He is known in connection with the introduction of gas lights in London. He wrote "A System of Chemistry" (2 vols., London, 1808), "A Practical Treatise on Gas Lights" (1815), and "On the Adulteration of Food."

ACELDAMA (Chaldaic, *'hakal dema*, field of blood), the name given to the potter's field which was purchased with the money for which Judas betrayed Christ. It was afterward used as a place of burial for strangers.

ACEPHALOCYST (Gr. *α* privative, *κεφαλη*, head, and *κυστις*, bladder; literally, a cyst without a head), a vesicular or hydatid growth, sometimes found in the substance of the liver, kidney, or other of the abdominal organs, in man and some of the lower animals. It is a globular bag or sac, having its walls composed of a condensed albuminous substance, of a laminated texture, and containing in its cavity a clear, colorless fluid, with albuminous or gelatinous ingredients. The main cyst produces smaller secondary cysts by a process of budding or outgrowth from its walls, and these secondary cysts are sometimes very numerous. They are developed between the layers of the principal cyst wall, and project sometimes internally and sometimes externally. Those species in which the young cysts project internally, and are thrown off into the central cavity, are called endogenous, and are found principally in the human subject; those in which they project externally are called exogenous, and are found in the ox and other ruminating animals. Acephalocysts are usually regarded as of a parasitic nature, and belonging to the class of cestoid worms, of which the ordinary tapeworm is the familiar representative. The embryo of these cestoid worms presents at one period a globular body armed with six calcareous hooks, which afterward becomes developed into a tapeworm head, enclosed in an inverted globular membrane. When one of these partially developed tapeworm heads is found by itself, surrounded by a cyst and imbedded in one of the internal organs, it is called a *cysticercus*. When the principal cyst enlarges and throws off a number of secondary cysts containing tapeworm heads, it is called an *echinococcus*. The acephalocyst is believed to be a growth having the same origin as the above, but in which for some reason the tapeworm heads either have not been developed at all, or have become disintegrated and disappeared. Hence its name, indicating the absence of the head, which, if present, would be decisive proof of its parasitic origin.

ACETATES, compounds of which acetic acid is one of the principal constituents. They are generally soluble in water and alcohol, and some of them are deliquescent; those that are least soluble are acetates of mercury, silver, molybdenum, and tungsten. There are three classes of salts, neutral, acid, and basic, all of them destroyed at a red heat or by sulphuric acid, which latter liberates acetic acid, easily recognized by its pungent odor. Heated with a mixture of sulphuric acid and alcohol, they give rise to acetic ether; with lime they furnish acetone, which has a peculiar characteristic odor; and distilled with caustic potash, they yield marsh gas. Their solutions yield a deep yellow color with ferric chloride (sesquichloride of iron), not given by free acetic acid. There are numerous acetates, some largely used in medicine and others in the arts. Among the former may be mentioned the following: potassic acetate, employed as a diuretic; ammoniac acetate, used as a diaphoretic; plumbic acetate (sugar of lead), used as an astringent. Of the acetates employed in the arts the most important are: acetates of alumina, manganese, iron, and zinc, largely used as mordants in calico printing; acetate of copper, verdigris, and a mixture of acetate and arsenite of copper called Schweinfurt green, employed in paints and for wall paper; acetate of lime, prepared as a crude material in the manufacture of acetic acid from the distillation of wood. Many modern chemists divide the acetates into two classes: 1. Metallic acetates, in which the basic hydrogen of the acetic acid is replaced by a metal or group; 2. Acetic ethers or organic acetates, in which the hydrogen is replaced by an alcoholic radical.

ACETIC ACID (Lat. *acetum*, vinegar, of which it constitutes about 6 per cent.) has been known in a dilute form from the remotest antiquity. It can be prepared in two conditions: acetic anhydride, or anhydrous acetic acid, and acetic acid. Anhydrous acetic acid, as obtained by Gerhardt, is a colorless, very mobile liquid, of high refracting power, having a very pungent smell and emitting a vapor which is extremely irritating to the eyes. It gradually absorbs moisture from the air, and becomes converted into the common acid. Acetic acid can be made in a great number of ways: by treating aldehyde, alcohol, and ethylic ethers with oxidizing agents; by fusing sugar, starch, oxalic acid, tartaric acid, or citric acid with potash; by submitting wood, sugar, and gums to dry distillation; by distilling gelatine, caseine, or fibrine with a mixture of sulphuric acid and manganese dioxide. It has been made synthetically by Wanklyn, by passing a current of carbonic acid into a solution of sodium methyl, and appears to exist ready formed in the juices of certain plants, such as the sap of the oak, and in some animal fluids. The product of the fermentation of wine and other spirituous liquids is vinegar, formed essentially of acetic acid diluted with water. (See VINE-

GAR.) The acetic acid employed in commerce is chiefly derived from the dry distillation of wood. The process, as described by the late William Allen Miller, is substantially as follows: Harder kinds of wood, particularly the oak, beech, birch, and ash, are subjected to destructive distillation in iron retorts by means of a heat gradually raised to low redness. The wood is usually placed in these retorts in loose iron cases, by which means the charge can be rapidly introduced without loss while the retort is still hot, and the charcoal can be withdrawn when the distillation is complete. The quantity of acid obtained varies from 1½ to 3½ per cent., and in the crude state is called pyroligneous acid, in allusion to the mode of its formation (Gr. *πυρ*, fire, and Lat. *lignum*, wood). During the operation a large quantity of tarry matter comes over, accompanied also by volatile and inflammable bodies, among which wood spirit, methyl acetate, and acetone predominate. These bodies are condensed in suitable receivers, while, in addition to carbonic anhydride, a considerable quantity of combustible gases, composed chiefly of hydrogen and carbonic oxide, is directed into the furnace, where they serve as fuel, and aid in heating the retorts. In about 24 hours, or as soon as the gases cease to escape, the loose iron cylinders containing the wood are withdrawn, and immediately closed with an air-tight cover, so as to allow the charcoal to cool excluded from the atmosphere. The crude acid liquid which has been collected in the condenser is decanted from the tar, and, when submitted to distillation, furnishes wood naphtha, which constitutes the more volatile portions; afterward the acetic acid is collected. The latter, however, is always accompanied by tarry matters. In order to get rid of these, the liquid is neutralized by the addition of the milk of lime or of sodic carbonate; a quantity of tar rises to the surface of the liquid on standing; this is skimmed off, and the solution of crude acid thus obtained is evaporated, and the dry residue, if the sodium salt be used, cautiously roasted at a temperature of about 500° F. (260° C.) to expel the tarry matters. It is afterward redissolved in water, decanted from the carbonaceous particles, which are allowed to subside, then recrystallized, and submitted to distillation with sulphuric or with hydrochloric acid, the sulphuric being preferable when sodic acetate is employed, while hydrochloric acid answers best when calcic acetate is used.—*Properties of Acetic Acid.* Normal acetic acid, $C_2 H_4 O_2$, is liquid at temperatures above 62·6° F. (17° C.); below this point it crystallizes in radiating tufts of plates, and is called glacial acetic acid. The concentrated acid has a sharp aromatic taste and a peculiar pungent odor; it blisters the skin if applied to it for a sufficient length of time. It boils at 242° F. (117° C.), and may be distilled unchanged. Its maximum density is 1·073, corresponding to a mixture of 77·2 per cent. acid and 22·8 per cent. water. The vapor of acetic acid is inflammable, burning with a blue flame and producing by its combustion water and carbonic acid.

ACETYLENE, a transparent colorless gas, of a peculiar disagreeable odor, perceptible when coal gas is imperfectly burned in the air. It burns with a bright smoky flame. Berthelot formed it by transmitting olefiant gas or marsh gas through red-hot tubes. When copper service pipes are used for distributing coal gas, a dark-red copper compound is sometimes deposited which detonates powerfully on the application of heat or on receiving a sudden blow. Some serious cases of explosions in New York, where the pipes were undergoing repairs, were traced by Dr. John Torrey to this cause. When mixed with chlorine, acetylene explodes spontaneously; it has not yet been liquefied by cold or pressure.

ACHÆAN LEAGUE. The inhabitants of Achaia were a very inconsiderable member of the Hellenic family until about 251 B. C. They formed 12 separate self-governing communities, united together only by the religious bond of a common temple, common festivals, and common ancestry. In the repulse of the Persian invaders, in the Peloponnesian war, and in the resistance to Macedonian conquest, they took little part; and it was not until Athens, Thebes, and Lacedæmon had been subdued or humbled by Macedonian supremacy, that the insignificant Achæans became illustrious. When the Macedonian monarchy was reeling beneath the invasion of the Gauls, four Achæan towns formed a league for mutual protection in 281. Soon afterward Ægium ejected its garrison, and some others forced their tyrants, who governed in the Macedonian interest, to lay down their authority. In 251 Aratus, the Sicyonian, brought round his native town to the Achæan league, and got himself elected head of the confederacy. Corinth was freed from its garrison in 243 by the aid of the league, and was admitted a member. Megara, Epidaurus, Trœzen, and the Arcadian cities joined soon after. In 208 Philipœmen, of Megalopolis, succeeded Aratus as general of the league. At this time, and especially after the total defeat of the Macedonian monarch at Cynoscephalæ, it was the only powerful state left in Greece, and the only possible bulwark against Roman power. When Sparta joined the league in 191 it included almost all the cities of the Peloponnesus, together with Athens, and several cities of northern Greece. For 50 years the Achæan confederation maintained the cause of Hellenic independence, and delayed the day of submission to Rome. (See GREECE.) At last the Roman senate succeeded in getting grounds of quarrel with the league, and sent Mummius over to complete the subjugation of Hellas. This was done in 146 by the defeat of Diæus, the general of the confederates, before the walls of Corinth. All Greece was then made into a Roman province, under the name of Achaia.—The Achæan league is the best example of the federative system bequeathed to the world by the Greeks. Each state or city, whether large or small, had but one vote, and retained its power of internal legislation, as well as its separate coins, weights, and measures, though the federal government had also its coins, weights, and measures, which were uniform. The right of intermarriage without loss of the children's citizenship, and the right of holding property and of importing and exporting on favorable terms, existed between the several cities of the federation, until taken away by the Romans, by way of punishment for resistance to their policy. The general assembly was held twice a year, but extraordinary assemblies were sometimes called. At the spring meeting the strategus or commander-in-chief, the hipparchus or master of the horse, and ten other functionaries called demiurgi, were elected. Although every citizen who could afford it might attend these assemblies, all the citizens of any one city could only throw one vote, a fact which made the larger cities, such as Corinth, discontented. Such a confederation in the age of Philip would probably have prevented the Macedonian conquest.

ACHÆANS, in ancient history, the name of one of the main divisions of the Hellenic race. Originally they dwelt in Thessaly, whence they migrated to the Peloponnesus, of which they were the ruling nation in the heroic period. Their name is therefore mentioned in the Iliad as a generic term for the Greeks. The well-greaved Achæans, the long-haired Achæans, are terms employed to designate the whole Hellenic host before Troy. Their mythological ancestor was Achæus, son of Xuthus, and grandson of Hellen.

ACHÆMENES. I. The ancestor and founder of the Achæmenidæ, the noblest family of the Pasargadæ, and from the time of Cyrus (third in descent from him, according to Herodotus) the royal family of Persia. In Latin poetry, *Achæmenius* is often used as a synonyme for *Persicus*, Persian. **II.** Son of Darius I., and brother of Xerxes, was made by the latter satrap of Egypt in 484 B. C., and accompanied him in his expedition against Greece in 480, when he commanded the Egyptian fleet. He fell in Egypt in 460, in an unsuccessful attempt to quell the revolt of Inarus, a Libyan chief.

ACHAIA, one of the ancient divisions of the Peloponnesus, extending along the coast of the gulf of Corinth; greatest length from E. to W. about 65 m.; breadth, 12 to 20 m. Patras, formerly Patræ, is the only Achæan town that has preserved any importance. The country was originally called Ægialea, that is, the coastland, and inhabited by Ionians, who were dispossessed by the Achæans on the conquest of the Peloponnesus by the Dorians. After the Roman conquest of Greece and Macedonia, the province of Achaia included all Peloponnesus, with N. Greece S. of Thessaly.—In the present kingdom of Greece it forms a nomarchy or province with Elis; area, 8,090 sq. m.; pop. in 1870, 149,561. Capital, Patras. (See ACHÆAN LEAGUE, and ACHÆANS.)

ACHARD, Franz Karl, a Prussian natural philosopher and chemist, born in Berlin, April 28, 1753, died April 20, 1821. He devoted himself to the development of the beet sugar manufacture, repeating and improving upon the experiments of Marggraf. The results of his investigations were published in 1799 and 1800, but found neither encouragement nor imitation, upon which account the king of Prussia presented him with a farm in Silesia where he could continue his studies. In connection with Neubeck, he spent six years of laborious endeavor before he discovered the true method of making the sugar.

ACHARD, Louis Amédée Eugène, a French novelist, born at Marseilles in April, 1814, died March 24, 1875. The first part of his life was employed in commerce and provincial administration, and he afterward became a journalist in Paris. In 1846 he accompanied the duke of Montpensier to Spain as a reporter. In 1847 he published *Belle-Rose*, a successful novel (5 vols. 8vo); and he afterward produced many others, besides a number of plays.

ACHATES. I. The companion of Æneas in his flight from Troy, and in his subsequent wanderings, according to the account given by Virgil. He is always termed *fidus Achates* (the faithful Achates), whence the phrase has passed into a proverb, applied to any faithful confidant in a subordinate position. **II.** In ancient geography, a river in the south of Sicily, between Camarina and Gela, now called Dirillo. According to Pliny, it was the place where the first agate was found; hence the derivation of the word agate.

ACHEEN, an independent sovereignty, comprising the N. W. portion of Sumatra; area, 25,500 sq. m. As early as 1509 the Portuguese visited this country, and in 1602 the English, in order to obtain a continuous supply of pepper, entered into a commercial treaty with the king. The East India company in 1659 established a factory at the capital; but it was eventually removed to Bencoolen, on the S. coast of Sumatra. Sir Stamford Raffles in 1819 secured to the East India company and the British government, by treaty, the right of freely trading to all the ports of Acheen. The government of Acheen is an hereditary monarchy, the power of the king or sultan being limited only by the power of his greater vassals. The kingdom is divided into 190 small districts. This part of Sumatra is comparatively healthy, but the interior is almost entirely unknown. The people are taller, stouter, and darker than the other Sumatrans. They are strict Mohammedans, and write in Malay characters. They manufacture a few silk goods, and a good deal of thick cotton cloth and striped and checkered stuffs.—**Acheen,** the capital, stands about a league from the sea, on a river that empties at Acheen head, the extreme N. W. point of Sumatra. The roadstead is good, being safely sheltered by several small islands. A bar at the mouth of the river prevents all but vessels of three or four feet draught from entering it. Most of the houses are built of bamboos and rough timber raised on piles, to escape inundation. The city contains many fine buildings, among which are numerous mosques and other public edifices, and the fortified palace of the king. It had formerly about 36,000 inhabitants, but is now on the decline.

ACHELOUS (now *Aspropotamo*), a river of Greece, which rises in Mount Pindus, flows S., separates Ætolia from Acarnania, and falls into the Ionian sea. Homer calls it the "king of rivers." It is the largest stream in Greece, its length being 130 miles.

ACHENBACH. I. Andreas, a German landscape painter, born in Cassel, Sept. 29, 1815. He studied at Düsseldorf, under Schirmer and Schadow, and at the age of 18 produced landscapes of merit. He afterward travelled over many parts of Europe in search of subjects, and took particular delight in reproducing the scenery of Norway, the Alps, and the Tyrol. His Italian landscapes are also impressed with a fine feeling for the picturesque. As a painter of the grand and savage aspects of nature, he holds a high rank. His works are widely scattered over Europe, and a number are owned in the United States. **II. Oswald,** brother of the preceding, also a painter of the Düsseldorf school, born in that city, Feb. 2, 1827. Since 1863 he has been professor of landscape painting at the Düsseldorf academy. His best pictures are of Italian scenery. His "Funeral of Palestrina" was rewarded with a medal at the Paris exposition of 1861.

ACHERON, in antiquity, the name of several rivers, all believed to be connected with the lower world. **I.** A river in Epirus, which flowed through Acherusia lake into the Ionian sea. **II.** A river in Elis, an affluent of the Alpheus. **III.** A river in Bruttium, S. Italy. **IV.** The river of the lower world, around which the shades were believed to hover. The name was also used for the lower world in general.

ACHERUSIA, in antiquity, the name of several lakes believed to be connected with the lower world. The principal ones were those in Epirus and Campania, the latter between Cumæ and Cape Misenum. Acherusia was also the name of a chasm in Bithynia, into which Hercules descended to bring up Cerberus.

ACHÉRY, Dom **Jean Luc d',** a French savant, born in 1609, died April 24, 1685. He was a Benedictine monk, librarian of the abbey of St. Germain des Prés at Paris, and devoted his life chiefly to collecting and editing documents relating to mediæval ecclesiastical history. His principal work was *Veterum aliquot Scriptorum qui in Galliæ Bibliothecis maxime Benedictinorum latuerant Spicilegium* (13 vols. 4to, 1655–'77; afterward reëdited by Barre, 3 vols. fol., 1723). He also assisted in the *Acta Sanctorum Ordinis S. Benedicti* (9 vols. fol.).

ACHILLES, properly **Achilleus,** the hero of the Iliad, was the son of Peleus, king of the Myrmidons in Phthiotis in Thessaly, grandson of Æacus, and thus third in descent from Zeus. His mother was the sea goddess Thetis, daughter of Nereus; hence he is often called Pelides, Peleïades, and Æacides. The story of his early life is told in different ways. One account is, that his mother, foreseeing his early death, endeavored to save him by dipping him in the river Styx, whose waters had the property of rendering the human frame invulnerable. The heel by which she held the babe was not wetted, and remained the sole vulnerable point of the hero. He was educated by Phœnix, who taught him war and eloquence, and by Chiron the centaur, who taught him the healing art. To keep him out of danger, Thetis disguised him as a maiden, and sent him to the court of Lycomedes, king of Scyros. Here his real character was soon discovered by the birth of a son to him, named Neoptolemus or Pyrrhus, by Deidamia, the daughter of Lycomedes. The prophecy was that Troy would never be taken in the absence of Achilles, and the crafty Ulysses was sent to discover him. Disguised as a peddler, he offered the Scyrian maidens female trinkets and weapons of war; all of them chose ornaments, but the disguised hero clutched the sword and shield. He went to Troy, accompanied by his tutor Phœnix and his friend Patroclus, and at the head of his Myrmidons, in 50 ships of war. Previous to his dispute with Agamemnon he ravaged the country round Troy, and took and destroyed 12 towns on the coast and 11 in the interior. Briseïs was his favorite female slave and concubine, whom he had captured at the sack of Lyrnessus. The commander-in-chief, Agamemnon, claimed her as indemnity for his slave Chryseïs. Achilles obeys on the entreaty of Minerva, but retires to his tent in wrath and resentment, refusing to take further part in the campaign. The Greeks suffer a myriad of woes in his absence, but no calamity will change his decision. At last his bosom friend Patroclus gains his permission to put on the armor of Achilles, and show himself to the Trojans. Believing that Achilles has come, they flee in panic. Patroclus presses on, and is slain by Hector. Then Achilles, in the desire to avenge his friend, reconciles himself with Agamemnon, receives Briseïs again, gets a new suit of armor from Vulcan, including the far-famed shield, which is brought to him by his mother, and rushes into the fight. He slaughters a great number of Trojans, contends with the river god Xanthus, whose course he has heaped with corpses and defiled with blood, and drives all the Trojans within the walls of their city. Hector alone dares to withstand his course. Achilles chases him three times around the walls of Troy, slays him, and, tying the body to his chariot, drags it into the camp of the

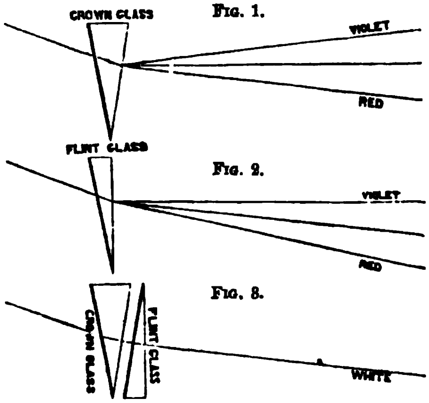
Greeks. He institutes games in honor of his friend, and slays 12 captive Trojan youths on the funeral pyre, to satisfy the manes of Patroclus. Priam, led by Mercury, penetrates to his tent, and prevails upon him to allow the body of Hector to be ransomed. We hear no more of Achilles in the Iliad. The accounts of his death are various. One represents him as falling by the arrow of Paris, directed by Apollo at the vulnerable heel, when he was in the temple of that god, about to espouse at the altar Polyxena, the daughter of Priam. His remains were collected in a golden urn, and a cenotaph was erected to him on the promontory of Sigeum. This monument was always an object of veneration to the Greeks; Alexander the Great performed a pilgrimage to it, and ran naked three times around it.

ACHILLES TATIUS. **I.** A Greek astronomer, supposed to have flourished in the 4th century of our era, and to be the author of a treatise on the sphere, a fragment of which is extant. **II.** A native of Alexandria, who wrote a Greek romance entitled "The Story of Leucippe and Clitophon," which has come down to us. He probably wrote near the close of the 5th century. By some biographers these two writers are considered identical.

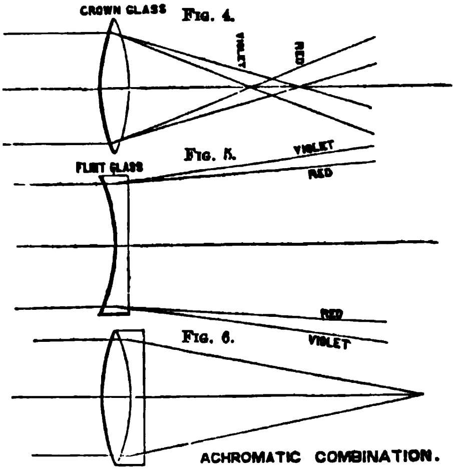
ACHMET. See Ahmed.

ACHMIM. See Ekhmin.

ACHROMATIC LENS (Gr. *a*, without, and *χρῶμα*, color). When light is refracted by any transparent medium, dispersion always takes place; that is, the rays of different color contained in white light are not equally refracted or deviated from their path. It would seem that the amount of this dispersion must always be proportional to the amount of refraction, but experiments have shown that diverse refracting substances differ considerably in this respect. Their dispersing and refracting properties are determined by passing a ray of light through solid prisms of different material, or liquid prisms enclosed between glass plates. The refracting power is then measured by the amount of deviation of the ray, and the dispersive power by the length of the colored spectrum produced. So it has been found that if the relative amounts of refraction of water, crown glass, flint glass, and oil of cassia are expressed by the numbers 133, 152, 162, and 159, the amounts of dispersion or the lengths of their spectra are in ratio of 145, 203, 433, and 1,080. If the angle of a prism is increased, the refracting and dispersing power both increase in the same ratio; and it is evident that two prisms of different material may be made at such angles that they produce the same length of spectrum, or possess the same dispersion, but that then their refracting powers will not be the same. In figs. 1 and 2 two such prisms are represented, the first refracting more than the second, but giving equal lengths of spectra. If now two such prisms are joined in opposite directions, as represented in fig. 3, they will cause a neutralization of the equal spectra, but not of the unequal refraction, and therefore they will produce a deviation or refraction of the rays without dispersion of the light; no colored spectrum will be produced, but only a pure white spot will be the result of such a combination, which is called an achromatic prism. This is the principle on which the lenses in all our modern telescopes, microscopes, photographic and other optical apparatus are constructed. A convex lens of crown glass brings the rays together to a number of differently colored foci, of which the red rays will be the furthest from the lens, fig. 4. (See Aberration, Chromatic.) A concave lens will throw the red rays nearer to the axis, fig. 5; but if this concave lens is made of flint glass (a material having a slightly greater refracting but a much greater dispersive power), and ground to such a curve as completely to neutralize the dispersion or coloring of the first lens, while it affects its refraction only so far as to lengthen its focal distance, the combina-



Refraction and Dispersion by Prisms.



Refraction and Dispersion by Lenses.

tion will bring the rays to a focus without separating the luminous rays into their colored constituents; see fig. 6. Such a lens is said to be corrected for chromatic aberration. Sometimes the concave correcting lens of flint glass does not quite accomplish the purpose, and then the combination is said to be under-corrected; but sometimes the opposite is the case, when the combination is said to be over-corrected. In this case the chromatic aberration will be the reverse of what it is with a single convex lens. As the different parts of the colored spectra produced by different media have not an exact proportionality toward one another, an absolute achromatism is impossible; but successful attempts have been made to cure it in some degree by the addition of a third lens of plate glass. Attempts to make achromatic lenses by enclosing fluids of different diffractive powers between glass lenses have all failed, by reason of the variability in such fluids; in the course of time portions of higher refractive power will accumulate at the lower sides, and by changes of temperature currents will be set up which disturb the images seen. As the manufacture of flint glass for large achromatic lenses is a very difficult and uncertain operation, and therefore very expensive, their size has been reduced by placing an over-corrected combination of half the size in the middle of the telescope; such an instrument is called a dialitic telescope. Recently the plan of the elder Herschel has been revived, namely, to use no large achromatic objective lenses at all, but reflectors, which of course can have no chromatic aberration, which is the result of refraction.

ACID, a compound of hydrogen, in which that element is united to an electro-negative radical. In common language the term is equivalent to the Latin word *acidus*, meaning anything sour. Oxygen was formerly considered to be the element upon which the existence of the acid character mainly depended, as its name (signifying generator of acids) implies; but later researches have brought to light a number of compounds containing hydrogen possessed of acid properties in which oxygen is not present. Hence hydrogen is now regarded as more truly the generator of acids than oxygen. The usual test for the presence of an acid is its property of changing blue vegetable colors to red. We are already acquainted with several hundred acids, most of them belonging to the organic kingdom, and new ones are constantly discovered by chemists. The juices of plants and the constituents of animal bodies furnish their peculiar acids; and with the changes these undergo new acids are generated by different modes of combination, which processes are now imitated by art so as to reproduce by synthesis a number of organic acids. Some acids, when uncombined, are gaseous, others fluid, and others solid. Their properties also are as various as the conditions in which they exist.

ACILIUS GLABRIO, Manius, a Roman general, who became consul in 191 B. C. He was of plebeian origin, but rose by regular gradation. He supported Cornelius Scipio; commanded as consul against Antiochus the Great of Syria, and defeated him at Thermopylæ; and subsequently carried on the war against the Ætolians with equal success. On his return he had a triumph. But this elevation and success of a plebeian gave offence to the patricians of Rome, who stirred up annoyances and accused him of keeping back the public spoils; but he was not condemned. He was the first to whom a statue of gold was erected in Italy. He wrote the annals of Rome in Greek, a narrative full of fables.

ACI REALE, a seaport town on the E. coast of Sicily, in the province of Catania, celebrated for its mineral waters; pop. in 1871, 85,787. It is situated on a hill of lava with a precipice over 650 feet high facing the sea, in the highly picturesque region between Mount Etna and Catania, 11 m. N. N. E. of the latter, at the mouth of the small river Aci; is well built, principally of lava, and has many churches, convents, and towers. Great quantities of diaper are made. Near the town are the famous cave of Polyphemus and the grotto of Galatea.

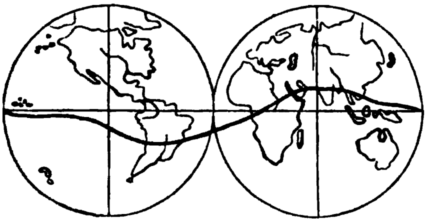
ACIS, in Ovid, son of Faunus and Symæthis, beloved by the nereid Galatea, and through jealousy crushed to death under a huge rock by Polyphemus. Galatea changed his blood into the river Acis, on which now stands the town of Aci Reale, where the scenes of the legend are still shown.

ACKERMANN. I. Konrad Ernst, a German comedian, regarded as one of the founders of the German stage, born in Schwerin in 1710, died in Hamburg, Nov. 13, 1771. In 1740 he made his début as an actor under the auspices of Schönemann, and afterward organized a travelling company, with which he performed in many places. He is celebrated as the founder of the Hamburg theatre (1765), whose performances inspired Lessing's famous comments on dramatic art. **II. Sophie Charlotte**, wife of the preceding (1749), previously widow of the organist Schröder, born in Berlin in 1714, died Oct. 14, 1792. She was not only distinguished as an accomplished actress both in tragedy and comedy, and teacher of the histrionic art, but also as the mother by her first marriage of Friedrich Ludwig Schröder (see SCHRÖDER), and of two daughters by her second marriage, also very distinguished: DOROTHEA, who retired from the stage in 1778 on marrying Prof. Unzer, and CHARLOTTE, whose death in 1775, in her 18th year, was generally deplored at Hamburg.

ACLAND. I. John Dyke, a British major, son of a baronet, commander of the grenadiers in the battle of Stillwater in the American revolution, Oct. 7, 1777, died in 1778. When overpowered by numbers the British retreated to their camp, which was furiously stormed by

Arnold. Major Acland was shot through the legs and taken prisoner. When Gen. Fraser was brought mortally wounded to the quarters of the baroness de Riedesel, a report reached Lady Harriet Acland (daughter of the earl of Ilchester), in a tent near by, that her husband was also mortally wounded. She determined to seek him in the American camp, although she was at the time much debilitated by want of food and rest, and by anguish of mind. She was received with kindness; her attentions restored her husband to health, and the bearing of the Americans toward both made a profound impression on the mind of Major Acland. After his return to England the next year, he was provoked to give the lie direct at a dinner party to Lieut. Lloyd for some foul aspersions on the American name. A duel ensued, and Major Acland was shot through the head, a circumstance which caused his devoted wife the loss of her senses for two years. She afterward married the Rev. Mr. Brudenell, a chaplain in the British army, who had accompanied her in her perilous pursuit of her husband, and died in 1815. She wrote a narrative of the campaigns of 1776–'7. **II. Henry Wentworth**, M.D., F.R.S., grandnephew of the preceding, born in 1815, physician to the Radcliffe infirmary, and Lee's reader in anatomy at Oxford, is distinguished as a promoter of sanitary reform. He accompanied the prince of Wales to the United States in 1860 as his medical attendant.

ACLINIC LINE (Gr. *α*, without, and *κλινειν*, to incline), an imaginary line on the earth's surface between the tropics, where the compass needle has no inclination; that is, where the dipping needle is horizontal. This line is also called the magnetic equator, being about 90° distant from the magnetic poles; it is variable and runs quite irregularly. At present it intersects the geographical equator near the W. coast of Africa, and some 160° E. of that point in the Pacific ocean. In the western hemisphere it is S. and in the eastern N. of the equator.



ACŒMETÆ (Gr. *ακοιμητος*, sleepless), an order of Greek monks who chanted the divine service day and night, without ceasing. This they accomplished by dividing themselves into three reliefs, succeeding one another alternately. Their centre was the cloister of Irenarion, near Constantinople. They flourished in the 5th century; in the succeeding century they were put under the ban of the church, on account of their leanings toward the Nestorian Christians and their doctrines.

ACOLYTE (Gr. *ακολουϑος*, attending), a clergyman in the Roman Catholic church, and in the churches of the East, next in rank to the sub-deacon, whose principal office is to light the candles on the altar, and attend on the priest or other sacred ministers during mass and vespers. The youths who serve at the altar are also called acolytes, though not ordained.

ACOMA, a village of New Mexico, in lat. 35° 24′ N., lon. 106° 10′ W., supposed by the abbé Domenech to be the Acuco of the ancient Spanish historians, and the oldest Indian town in the territory. It is built upon the horizontal summit of an isolated and almost perpendicular rock 394 feet in height. The greater part of the ascent to it is made by means of a road cut like a spiral staircase in the rock. The village consists of large blocks of houses, 60 or 70 in each block. It is said the Spaniards took the town from the Indians in 1599.

ACONCAGUA. I. A central province of Chili; area, about 6,000 sq. m.; pop. in 1868, 130,672. The entire eastern portion is occupied by rugged spurs of the Andes and very fertile valleys, watered by several rivers flowing through the province to the Pacific. This region abounds in copper, silver, and gold mines; the last were at one time very famous. In 1862 there were in working order 8 gold, 9 silver, and 228 copper mines. The western part is irrigated by innumerable artificial water courses, supplied from the rivers, by means of which large crops are produced of excellent wheat and other cereals, as well as of hemp of a very superior quality. Such irrigation is rendered indispensable by the extraordinary scarcity of rain. The province is divided into the five departments of Andes, Ligua, Petorca, Patacudo, and San Felipe. Capital, San Felipe de Aconcagua, situated at the foot of the Andes, in a fertile valley 2,000 feet above the Pacific, 55 m. N.E. of Valparaiso; pop. about 7,000. **II.** A peak of the Andes in the preceding province, N. E. of San Felipe, in lat. 32° 39′ S., lon. 70° W., believed to be the highest in this hemisphere. According to the measurement of M. Pissis, to the results of whose labors more credit is given than to those of any other scientific investigator of the Andes, Aconcagua reaches a height of 6,834 metres, or 22,422 feet, above the level of the ocean, being 997 feet higher than Chimborazo and 1,138 feet higher than Sorata, which were formerly considered the most elevated peaks of the Andean chain. Aconcagua has been described as the cone of an extinguished volcano, and the error probably arises from a widely published statement of Darwin, who asserts that when in the Beagle expedition in 1835 it was reported to him that the volcano of Aconcagua was in eruption. Neither its shape nor its external features would indicate an extinguished volcano; it is a colossal, angular, and serrated mass, without any lava or other vestiges of volcanic action, and can only be seen in all its grandeur from the east, because the mountains which surround it on the west impede the view. From Valparaiso a view of the peak only, rising far above the summits of even that gigantic chain of mountains, is obtained.

ACONITE (Gr. *ακονιτον*, probably from *ακονη*, a stone, because it grows in stony places), a genus of plants of the order *ranunculaceæ*, one of the distinguishing marks of which, the hooded form of the upper sepal, gives the name monkshood to a cultivated species. A plant of this name was known to the ancients, and may have been one of the species now belonging to the genus. The species at present in use as a medicament is the *aconitum napellus*, cultivated in our gardens under the name of monkshood; but several other species possess similar properties in at least an equal degree. Among these are *A. lycoctonum* and *A. ferox*. Probably the latter, from which the *bish* root of Nepaul in India is obtained, possesses the most deadly qualities. This was used by the natives to poison their wells on the advance of the British army into their territories. Some of the cultivated varieties of *A. napellus*, having leaves of a lighter shade of green, with blue and white flowers, have less acridity than the darker variety, and would probably, if used, be found to possess less medicinal power.—From the roots and leaves of the officinal species are prepared extracts and tinctures. Those from the root are the most powerful, and are largely used in medicine. The physiological action of this drug depends chiefly, and probably entirely, upon the alkaloid aconitia, though two other alkaloids, aconella and napellina, besides aconitic acid, are among its constituents. Aconitia is a white substance, not volatile at ordinary temperatures, slightly soluble in water, and readily so in alcohol, ether, and chloroform. It is probably not crystallizable, and the crystallized specimens exhibited as such consist partly of aconella, which is crystallizable and inert in doses in which aconitia would be fatally poisonous. This statement derives support from the fact that the French and German aconitia, which is partially crystallizable, is much weaker than the English. This alkaloid is one of the most powerful known poisons. One fiftieth of a grain has repeatedly proved fatal to dogs, and nearly so to man. Its effects, which may be considered equivalent to those of a corresponding dose of aconite or its tincture, are a burning and swelled feeling of lips, tongue, and pharynx, nausea and sometimes vomiting, headache, shooting pains of the face, difficult respiration, general prostration, and, after a slight preliminary rise, a marked diminution of the frequency and force of the heart's pulsations. As the fatal dose is approached the pulse again becomes rapid and feeble. The mind is clear, and there is but little somnolence; the pupil is dilated, but less so than by atropia. Fatal poisoning has taken place, not only from the use of the medicinal preparations of the drug, but from its being mistaken for horseradish or other edible plants, from which with care it can be readily distinguished.—The therapeutic action of aconite is obtained by doses much smaller than those which give rise to the effects just described. A slight tingling of the lips and tongue may be regarded as a sign that the dose is not to be increased. Since its action, after a primary slight stimulant effect, is essentially to diminish the activity of the nervous system, and secondarily that of the heart, it is used in medicine for two objects: first, to diminish pain, as in neuralgia; and secondly, to diminish the activity of the heart in inflammatory diseases. According to some observers, aconite possesses a greater power in the reduction of certain kinds of inflammatory fever than can be accounted for by the effects upon the heart described above; but it is to be remembered that some of the diseases in which aconite is supposed to display peculiar power, tonsillitis for instance, have naturally a very limited duration. It is admitted by most observers that the curative effect of aconite is displayed chiefly in the early stages of inflammations. The list of diseases in which aconite has been used is very large, embracing those in which inflammatory or neuralgic symptoms are prominent. In poisoning by this drug, after evacuation of the stomach, stimulant remedies, such as alcohol, wine, and brandy, and dry heat to the surface, should be used.

Aconitum napellus (Monkshood).

ACONITE, Winter (*eranthis hyemalis*), a small tuberous and herbaceous plant, growing without stem, and bearing in early spring bright yellow flowers of cup form. Its leaves are smooth, pale green, many-cut, and peltate; and its scape, only a few inches high, is single-flowered.

ACONITIA. See ACONITE.

ACOSTA. I. **José de**, a Spanish writer, born about 1539, died Feb. 15, 1600. He entered the society of Jesuits at 14, and on completing his course of study was appointed professor of theology at Ocaña. In 1571 he was sent as a missionary to South America, of which, after his return to Spain, he published a history (*Historia natural y moral de las Indias*, Madrid, 1590). This work has been translated into several languages. He also wrote *De Natura Novi Orbis*, and some other works, chiefly of a polemical character. II. **Uriel**, a Jewish writer, born in Oporto, Portugal, about 1590, died by his own hand in Holland in April, 1647, or, according to some accounts, in 1640. He belonged to a family converted to Christianity at the time of the expulsion of the Jews from Portugal, and was educated by Catholic teachers, but soon conceived doubts concerning the Christian doctrines. He finally fled, with his mother and a brother, to Amsterdam, embraced the faith of his ancestors, and exchanged his original name Gabriel for Uriel. He failed, however, to recognize in the rabbinical Judaism of his time the ideal of his independent speculations, and became involved in a passionate controversy with the religious heads of the Jewish congregation of Amsterdam, in the course of which, having suffered excommunication, he published in Portuguese a "Criticism of the Pharisaic Traditions, compared with the Written Law," in which he repudiated the doctrine of the immortality of the soul. He was now arraigned before the magistrates and heavily fined. After many years of exclusion from the synagogue he signed a recantation of his views, but subsequently again provoked the ire of the orthodox, among whom were his own relatives, was a second time excommunicated, and finally submitted to an ignominious public chastisement. Maddened by persecution, he put an end to his life by a pistol shot, leaving an autobiography, which was published in Latin and German in 1687. III. **Joaquin**, a South American historian, colonel of engineers in the Colombian service, died about 1862. In 1834 he explored the valleys of the Socorro and Magdalena rivers with the botanist Cespedes, and in 1841 made researches relative to the Chibchas and other aboriginal tribes. He continued these investigations in the archives of Spain and France, and in 1848 published in Paris *Compendio historico del descubrimiento y colonizacion de la Nueva Granada, en el siglo decimo sexto*. In 1849, in conjunction with M. A. Laserre, he published a new and enlarged edition of the celebrated *Semenario de la Nueva Granada*, with a biographical notice of the author, the learned Caldas, who was shot in 1816. A series of archæological essays were furnished by Acosta, for publication, to the Paris geographical society, 1854 *et seq.*

ACOUSTICS (Gr. ἀκούειν, to hear), that branch of physical science which explains the phenomena and laws of sound. For the production of these phenomena three conditions are required: 1, a sonorous body; 2, a medium to propagate, and 3, an organism to perceive the sound. From these conditions the science of acoustics is naturally divided into three branches, of which the last belongs entirely to the field of physiology, or rather biology, while in the first two the most intricate and at the same time most successful application of mathematics to mechanical science is to be found. A superficial examination into the cause of sound shows that it originates in vibrations of the sounding body, and is thus a result of its elasticity. The air, being very elastic, is ordinarily the medium by which sound is transmitted to our ears; but most other bodies, solid as well as liquid, transmit sound as well and even better than air, while in a vacuum transmission ceases, as is proved by the well-known experiment of exhausting by means of an air pump the air from around a continuously ringing bell. The phases of the sonorous vibrations are appropriately called undulations or waves; they are communicated to the body transmitting the sound by one or more impulses from the sonorous body, and are transmitted by alternate compressions and expansions of the parts. The velocity of this transmission for air at the freezing point of Fahrenheit is 1,090 feet per second, and about one foot more for every degree above. Very violent sounds, however, travel faster, as proved by Boyden in Boston and Earnshaw in Sheffield, England; the cause of this is the heat developed by strong compression of the air by a powerful wave of sound. Heavy gases transmit sound slower and light gases faster than air: carbonic acid 858 feet, hydrogen 4,164 feet per second. Water transmits sound with about the same velocity as the latter, while alcohol, ether, and turpentine transmit it slower (3,800 feet), and saline solutions in water faster (from 5,000 to 6,500 feet per second). Through metals the transmission is in round numbers as follows: lead, 4,000 feet per second; copper, 11,000; iron and steel, 16,000. If a wave is violent enough to produce a shock against the drum of the ear, a sound is always heard even if there be but a single wave; such is the case with a clap of thunder, the explosion of a gun, or the crack of a whip. But if the waves are weak, such as those produced by the vibration of a string, there must be a succession of them at a certain rate of rapidity, in order to make the sound audible. If these waves succeed one another at regular intervals and thus have equal lengths, we have a musical tone; if irregular, they produce merely a noise.—The lowest tone used in music is produced by an organ pipe nearly 32 feet long, in which the tone is produced on the same principle as in the flute, by blowing a current of air against a sharp edge;

the friction causing a vibration of the air column in the pipe, on the same principle as the friction of a violin bow causes the vibration of a string. The length of the wave produced in an organ pipe is equal to the length of the pipe; and as sound travels through air with a velocity of about 1,090 feet per second, it must pass through a pipe 32 feet long in nearly the 32d part of a second, and thus produce 32 waves per second. If the pipe is 16 feet long, we must have 64 waves per second; for an 8-feet pipe, 128 waves; 4 feet, 256; 2 feet, 512; 1 foot, 1,024; 6 inches, 2,048; 3 inches, 4,096; and 1½ inch, 8,192 waves. These are the correct velocities of vibrations of the tones represented by the note called C, Ut, or Do, from octave to octave, according to the so-called theoretical pitch. In Handel's time the lower C corresponded to 31 vibrations per second, and the Italian opera in London had it in 1859 at 34 vibrations; while the pitch recently established by the French conservatory of music and by a congress of musicians in London agreed to nearly 33 vibrations, corresponding to the Stuttgart pitch. Only the eight octaves mentioned above are used in music. The capacity of the ear, however, extends an octave below the lowest and more than two above the highest of these figures, being between 16 and 38,000 vibrations per second; but there is a difference in this regard between individuals, some persons being perfectly deaf for very low or very high tones distinctly heard by others. The seven different tones of the so-called diatonic scale are interpolated between the octaves given above, and expressed by the customary notes and staff of five lines with clef, or by the letters C, D, E, F, G, A, B, C. They correspond for the lower octave with the velocity of vibrations 32, 36, 40, 42⅔, 48, 54, 60, and 64 vibrations per second respectively; by multiplying either of these numbers by 2, 4, 8, 16, &c., we obtain the velocities of any other octave. It is seen that some of these numbers bear simple ratios to one another, as C : C = 1 : 2, C : G = 2 : 3, C : F = 3 : 4, C : E = 4 : 5, E : G = 5 : 6; these tones harmonize, the others are discordant. The further comparison of the numbers shows that the differences between the 3d and 4th and between the 7th and 8th of the scale are less than those preceding or following. This has given reason for the interpolation of five other tones between those of which the differences are greater, so as approximately to equalize these differences; in this way 12 tones in each octave have been obtained, forming a scale called chromatic. These interpolated tones are inappropriately called semitones, and designated with the same sign as the next note, but preceded by a ♯ (sharp) or ♭ (flat). This scale is represented in the velocity of vibrations and in name as follows:

C	C♯	D	D♯	E	F	F♯	G	G♯	A	A♯	B	C
32	34	36	38	40	42⅔	45	48	51	54	57	60	64

The keyed instruments give a material representation of this scale. The relation of progression between its tones, when tuned according to the proportions given here, is so irregular, that when transposing the diatonic scale, that is, when commencing it at another tone than C, very impure harmonies are obtained. This is corrected, or rather compromised, by making the mutual proportions of the 12 numbers representing the chromatic scale such as to obtain a regular geometrical series; this is the so-called equal temperament. In order to accomplish this with strict mathematical accuracy, we have only to interpolate 11 terms of such a series between the numbers 1 and 2, which express the relations between a tone and its octave; this is mathematically expressed by the series

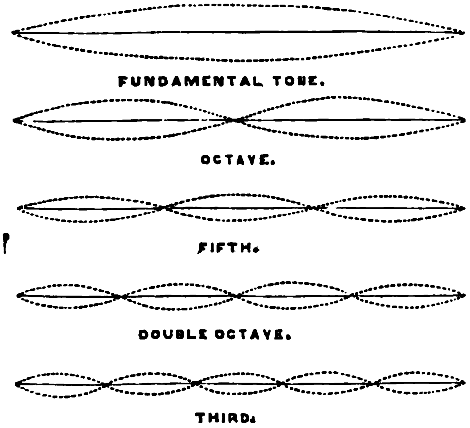
$$2^0,\ 2^{\frac{1}{12}},\ 2^{\frac{2}{12}},\ 2^{\frac{3}{12}},\ 2^{\frac{4}{12}},\ \&c.,\ \text{to}\ 2^{\frac{12}{12}};$$

or by logarithms: log. $\frac{2}{12}$, log. $\frac{3}{12}$, log. $\frac{4}{12}$, &c., to log. $\frac{24}{12}$, which by calculation gives the series 1·000, 1·0594, 1·1225, 1·1892, 1·2599, 1·3348, 1·4142, 1·4983, 1·5874, 1·6818, 1·7818, 1·8877, 2·000. Multiplying each of these numbers by 32, we obtain the velocity of vibration for the lower octave, for the absolute equal temperament:

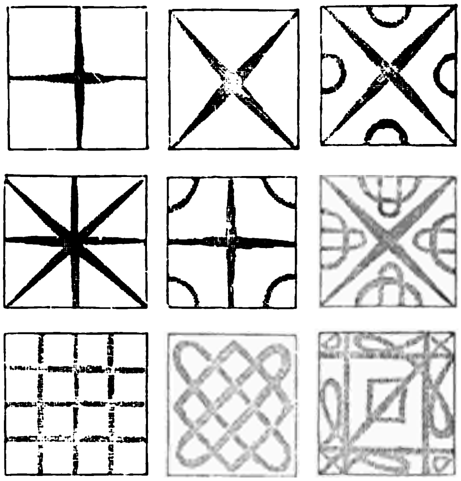
C	C♯	D	D♯	E	F
32·000	33·8908	35·9200	38·0544	40·3168	42·7136

F♯	G	G♯	A	A♯	B	C
45·2544	47·9456	50·7968	53·8176	57·0176	60·4064	64·000

It is seen, by comparison with the numbers mentioned before, that this series gives C♯, D, G, and G♯ too low, while the other eighth tones are too high. However, this is only the case when considering the interpolated semitones as sharps; but as we must use C♯ for D♭, D♯ for E♭, &c., and the calculation for the tones corresponding with these flats gives us different figures, between which and the former the equal temperament is a compromise, the advantages are acknowledged to be with the latter, and it is now therefore universally adopted. (See Music.) A column of air in a pipe will not necessarily vibrate in such a way that each wave will be equal to the length of the pipe. By modifying the manner of admitting the air, either by increased pressure or changing the aperture, the waves may be made one half, one third, one fourth, one fifth, &c., of the length of the pipe. In this way the so-called harmonics and the tones of the French horn are produced. They are called over-tones, if the fundamental vibration producing the lowest tone is still heard at the same time. In order to produce all kinds of shorter waves by means of the same pipe, holes may be made in its sides, closed by the fingers or by proper valves. The opening of these holes is nearly equivalent to a shortening of the pipe. Thus the different tones of the flute, clarinet, hautbois, bassoon, and several other wind instruments, are produced. In the trombone, the length of the tube is increased and diminished by a sliding arrangement; while in the cornet à piston and similar brass instruments, the same elongation and shortening is produced by piston valves admitting or shutting off the air from side channels of greater or lesser length. In stringed instruments the same results are accomplished by different length of strings. As in the organ every pipe produces only a single tone, so in the pianoforte every string is intended for one tone; while in the harp, by a slight shortening, the pitch of each string may be raised a so-called semitone. In all the other stringed instruments, as the violin, violoncello, and guitar, the different tones are produced by the use of very few strings only, which, however, by proper manipulation with the fingers, may be shortened so as to produce tones of which the vibrations become faster in proportion as the sounding portion of the string is shortened. In regard to the law governing their vibration, it is the same for strings as for pipes. Other circumstances being equal, their velocity is inversely proportional to the length of the pipe or string. The tone of strings also changes by change of tension, and the velocity of their vibration is in the ratio of the square root of the weights which produce this tension. Further, the tone depends upon the thickness of the string, its rigidity, weight, and nature of material. When a string is subdivided into a number of equal parts, these parts will vibrate simultaneously, leaving the points of division at rest, and produce the harmonic tones, after the same law as in the case of a column of air in the French horn. The subjoined five figures give the manner of vibration of a string as a whole, half, third, fourth, and fifth parts, producing different tones, the harmonics of the fundamental tone, its octave, fifth above or twelfth, its double octave, and third above that, or seventeenth. On the violin these subdivisions may be effected by slightly touching the string on one of the points dividing it into equal parts, and the harmonic upper tones thus produced are called the flageolet tones. In the Æolian harp, in which the strings are put into vibration by the friction of a current of air, these divisions are incidentally and continually changing, and thus a variety of harmonic tones is produced. The division points, where the string happens to be at rest, are called nodal points. An elastic plate of glass, brass, steel, or other suitable material, may also be made to vibrate and emit tones; and when fixed at one point and excited at one of its edges by a violin bow, it may be made to produce a considerable variety of tones, by the fact that it may be subdivided into various systems of nodal lines; the spaces between these lines are the sounding portions, and the vibrations are more rapid or the tones sharper in proportion as these spaces are smaller. These nodal lines may be made visible by scattering dry sand over the plate, and when it is put into vibration with the violin bow, the grains of the sand which are not on the nodal lines will be thrown aside, and not come to rest until they are accumulated upon the nodal lines. Thus many kinds of regular and almost geometrical figures may be formed, which are called, after the inventor of this method, Chladni's nodal sound figures. With different forms of plates, many hundreds of such figures have been obtained. Our figures illustrate only a few of the most remarkable. The first and most simple is produced by the lowest tone which can be obtained from the disk; the others belong to higher and higher tones, while the last and most complicated is produced by the highest tone; in this case the smallest parts of the glass disk vibrate for themselves, and produce then the most rapid vibrations. It is thus seen that every tone which may be

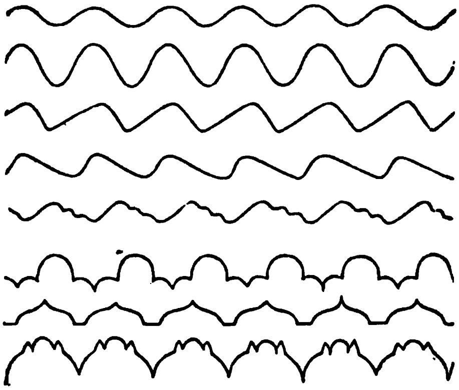


Harmonic Sound Waves of a String.



Chladni's Nodal Sound Figures.

drawn out of a disk produces its own characteristic nodal lines or figures. (See Chladni's "Acoustics.")—Tones may differ not only in the velocity of their succeeding waves, but also in the form of these waves; this determines the character of the tone which the French call *timbre*. By it we distinguish the sounds of different instruments, the voices of different persons, &c. Comparative physiology has determined which special portions of the interior structure of the ear are intended for the different functions in the act of hearing, by finding some parts more or less developed in proportion as the animal possesses the capacity of distinguishing variations of sound. So the dog, with no musical ear, distinguishes the voice of his master better than those singing birds which can learn a tune and thus have a musical ear. (See EAR.) Recently experimenters have succeeded in causing sounds to draw waving lines on slips of moving paper, these waves representing not only the pitch or velocity of vibrations, but by their different forms also the nature of the sounds. In our figures are represented a few illustrations of the waved lines produced by this method of registering the nature of diverse vibrations of the same length and pitch. The apparatus with which this is performed is called a phonautograph.—In regard to the application of acoustics to architecture, and the construction of buildings intended for music or public speaking, much learning has been erroneously applied. The elliptical and parabolic forms given to walls or ceilings have not answered expectation, for the simple reason that they concentrate the sound at single points at the expense of others. Experience has however taught a few facts, of which the most important is that an echo is the greatest disturbing influence, and that large smooth walls and ceilings at a distance from the speaker make this disturbance a maximum. Speakers, singers, or musical instruments must therefore be placed as near to such a wall as practicable; and when a high flat or arched ceiling causes reflection or reverberation of sound, as is often the case in large churches, a horizontal sounding board of some 20 or more feet in diameter, thus projecting far beyond the pulpit, and placed as low as possible, only a few feet above the speaker's head, has been found the only effective remedy. It is seen in most of the cathedrals and large churches on the European continent.—Among the earlier writers and investigators must be mentioned Euler, Newton, Laplace, Chladni, and Savart; and among the later, Helmholtz, Weber, König, Herschel, Wülner, and Tyndall. See especially Helmholtz, *Die Lehre von den Tonempfindungen* (Brunswick, 2d ed., 1865); Tyndall, "Lectures on Sound;" Peirce, "On Sound," prepared from Herschel's writings; and Wülner, *Experimentalphysik* (Leipsic, 1871, vol. i.).



Sound Lines traced on Paper by the Phonautograph.

ACQUAVIVA, Claudio de, a general of the Jesuits, born in Italy in 1542, died in 1615. He regulated the studies of the order of Jesuits in an ordinance promulgated at Rome in 1586, which became famous under the title of *Ratio Studiorum*. He prohibited discussions on the subject of tyrannicide, and his opinions are still regarded as authoritative by the order.

ACQUAVIVA DELLE FONTI, a town of S. Italy, province of Terra di Bari, 18 m. S. of Bari; pop. in 1861, 6,517. It is surrounded by walls, and has a handsome parish church.

ACQUI (anc. *Aquæ Statiellæ*), a town of Italy, capital of a district of the same name, in the Piedmontese province of Alessandria, on the left bank of the Bormida, 18 m. S. of Alessandria; pop. about 9,000. It is much frequented by invalids for its famous hot sulphur springs, which were well known to the ancient Romans. The remains of a Roman aqueduct are among its curiosities. It contains many handsome buildings, among them a cathedral, convents, a college, and a theological seminary.

ACRE (Lat. *ager*, Ger. *acker*, a cultivated field), a standard measure of land, consisting in England and the United States of 4,840 square yards, or 43,560 square feet. In surveying, it is composed of 10 square chains, the measuring chain being 66 feet long. There are 640 acres in an English statute square mile. The Scotch acre is 1·27 of the English, and the Irish 1·62; the French and Belgian hectare, 2·47, and the arpent 0·99 (Geneva, 1·27); the Swiss faux, 1·62; the Spanish fanegada, 1·06; the Portuguese gueira, 1·43; the Austrian joch, 1·42; the Danish toende, 5·50; the Swedish tunneland, 1·13; the Russian desiatina, 2·70. The morgen of Germany is generally about 0·65 of an acre, but it has heretofore varied in the different states from 0·63 to 2·40; in Holland it is 2·10, and in Poland 1·38. The moggia of Naples is 0·83 of an acre; the giornate of Sardinia, 0·93; the saccata of Tuscany, 1·22. The ancient Roman jugerum was 0·66 of an acre, and the Greek plethron 0·23.

ACRE, or **St. Jean d'Acre** (called *Acca* by the Turks, *Accho* in Scripture, and *Ace* and *Ptolemais* by the Greeks), a seaport town of Syria,

St. Jean d'Acre.

N. of Mt. Carmel, 64 m. S. of Beyrout, in lat. 32° 54′ N., lon. 35°.4′ E.; pop. about 5,000. It is on an almost triangular peninsula, and on the land side is surrounded with beautiful new fortifications; remains of the old fortifications still project from the sea. Its harbor is the best on that part of the coast, although very shallow. The place is of the highest antiquity, mentioned in the history of the Jews, Persians, and Ptolemies, and is renowned for its desperate sieges and defences. In 1104 it was taken by the Genoese, from whom Saladin retook it in 1187. The assault upon it by Richard Cœur de Lion in 1191 was one of the most daring feats in the crusades. After its capture by the Christians in that year, it remained in the custody of the knights of St. John, who fortified it strongly, till 1291, when they were compelled to evacuate it by the sultan of Egypt. The Turks occupied it early in the 16th century. In 1799, supported by Sidney Smith and a few British sailors, they kept Bonaparte and the French army at bay for 60 days, when he raised the siege and retreated. In 1832, when Mehemet Ali revolted from the Porte and seized upon Syria, Ibrahim Pasha, after a long siege, took Acre by storm. In 1839 Syria was restored to Turkey, but Ibrahim refused to evacuate Acre till after a bombardment by the combined British, Austrian, and Turkish squadrons, Nov. 4, 1840.

ACRELIUS, Israel, a Swedish clergyman, born Dec. 25, 1714, died April 25, 1800. He studied in Upsal, and was ordained in 1743. In 1749 he was appointed provost of the Swedish congregations on the Delaware, and pastor of Raccoon and Pensneck, and subsequently of Christiana. He managed the ecclesiastical affairs of the Swedish colonists, which he found in great disorder, with zeal and prudence. Ill health, however, compelled him to resign his situation in 1756, and return to Sweden. The king bestowed upon him a large pension, and the lucrative living of Fellingsbro. Besides some articles on American affairs in the Swedish journals, and numerous religious works, Acrelius published a description of the Swedish colonies in America (4to, 1759).

ACROCERAUNIA (Gr. *ἄκρον*, peak, and *κεραυνός*, thunderbolt), in ancient geography, the N. W. extremity (now Capo Linguetta) of the Ceraunian mountains in Epirus, so called from its being often struck by lightning. The name is sometimes improperly applied to the whole range. (See Ceraunian Mountains.)

ACROPOLIS (Gr.), the highest point of a city, or its citadel, usually on a rock or hill. The ruins of the most celebrated, that of Athens, still exist for the delight of travellers. It had five gates, the principal a splendid structure of Pentelican marble, and within its bounds still stands the Parthenon or temple of Minerva.

ACT. See Bill.

ACTA DIURNA (Lat., daily doings), the name of daily reports issued in ancient Rome, chiefly under the empire. They were published by authority, and contained a brief chronicle of the proceedings at public assemblies, and in the tribunals both civil and criminal, together with a register of births, deaths, marriages, and some other interesting matter. Divorces, being matter of scandal, were a staple item of domestic intelligence in an age when printing was unknown. The circulation must have been very limited, and the transcripts chiefly for the use of the patricians. Reporters (*actuarii*) were employed to procure interesting news not to be found in official registers.

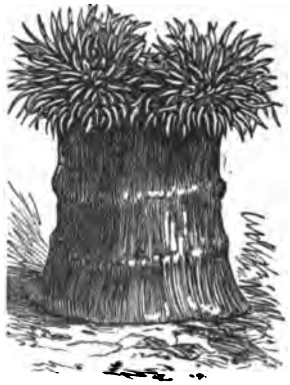
ACTÆON, in Greek mythology, a hunter, grandson of Cadmus, who, for the crime of watching Diana while bathing, was transformed into a stag, and devoured by his own hounds.

ACTA ERUDITORUM (the transactions of the learned), the title of the first literary journal of Germany, founded in 1682 by Otto Mencke, professor in the university of Leipsic, and several associates, and published monthly in Latin. It remained in the hands of the Mencke family and preserved its reputation until, in 1754, it fell under the charge of Professor Bel, who managed it so negligently that it lost character and circulation. The calamities of the seven years' war also operated against it, and it languished till 1782, when the last volume appeared, which, however, only brought up the review to 1776. The whole collection is contained in 117 vols. 4to. In 1732 the title was changed to *Nova Acta Eruditorum.* The work having met the approbation of the critics of foreign countries, and its convenience being undeniable, a numerous race of imitators soon sprung up in France, Germany, and England.

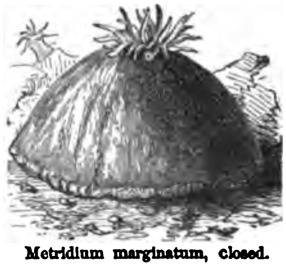
ACTA SANCTORUM, Acta Martyrum, Martyrology. The ancient church gave the name *Acta Martyrum*, or "Acts of the Martyrs," to the records of the lives and sufferings of the martyrs which were kept for the edification of the faithful. The oldest acts extant are those referring to the death of St. Ignatius of Antioch (107). When to the lives of the martyrs those of other pious men were added, the collections received the name *Acta Sanctorum*, "Acts of the Saints." The deaths of pious men, and the circumstances attending their death, being communicated by the various Christian congregations to each other, an alphabetical list was occasionally hung up in the churches to keep their names fresh in the recollection of the brethren. These lists grew into brief biographies, and at length the institution of canonization and the dedication of particular days to the memory of the saints introduced their names and histories into the breviary and missal. The oldest collection of the acts of the martyrs was compiled by the church historian Eusebius in his two works *De Martyribus Palestinæ* and *Synagoge Martyriorum.* Collections of the most important lives were made in the 6th century by Gregory of Tours, and in the 10th by Simeon Metaphrastes. A more critical treatment is found in the *Sanctuarium* of Boninus Mombritius, and particularly in Ruinart's *Acta Martyrum Sincera* (fol., Paris, 1689). By far the most celebrated collection of the lives of saints is that commenced by the Jesuit Bolland (died 1665), and still continued by a society of Jesuits, called Bollandists. In fact, this collection is so much more important than any other work of the kind, that in the history of literature it alone is understood by the name *Acta Sanctorum.* (See BOLLAND.)

ACTIAN GAMES, in Roman antiquity, solemn games instituted by Augustus in memory of his victory over Mark Antony at Actium, 31 B. C., held every fifth year, and celebrated in honor of Apollo, surnamed Actius.

ACTINIA (Gr. ἀκτίς, ray), a genus of marine radiated animals, commonly called sea anemones, from their resemblance to flowers. They are fleshy polyps, termed *zoanthoria* by De Blainville, and *zoophyta helianthoidea* by Dr. Johnston. The body is regular and somewhat like a flower in form, more or less elongated and very contractile, enabling it to assume a great variety of shapes. It has a sac-shaped digestive apparatus, with an oval orifice, surrounded by tubular tentacles of various forms. In many species the base of the body acts as a sucker, by means of which they adhere to rocks, stones, &c., while the opposite extremity presents a disk with a central orifice. This is surrounded by tentacles either in a single row or in several rows, which act as so many arms by which the animal seizes its prey and drags it into his mouth. Its only organ, the stomach, performs almost all the functions of animal life; this has, besides its opening from the mouth, one at the bottom communicating with the general cavity of the body, which may be shut at will, making a closed sac where digestion is rapidly performed by means of active secretions. The lower cavity is divided by folds running from the circumference toward the centre, from top to bottom of the animal, the food circulating freely among these partitions by the action of vibratory cilia on their walls. Digestion is



Metridium marginatum (Fringed Actinia), expanded.

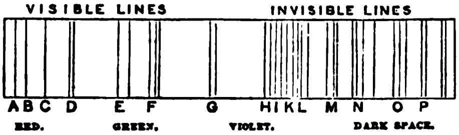


Metridium marginatum, closed.

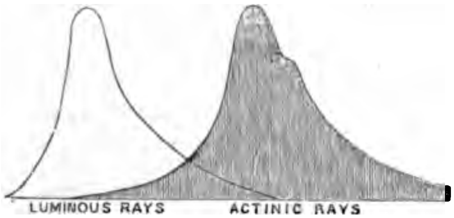
here combined with a kind of circulation; they have no blood, no vessels, no respiration other than that effected by the currents of water in the interior, doubtless accompanied by a change of substance. The surface of the tentacles is thickly studded with microscopic vibratile cilia in constant motion, causing currents which bring to them their microscopic food, sweeping a space of several inches. Each tentacle is a tube, with longitudinal and circular fibres, by which it can be shortened, lengthened, and moved in all directions. Upon the tentacles are great numbers of microscopic so-called "lasso cells," each containing a long hollow thread coiled spirally within it, which can be suddenly thrust out, benumbing and arresting shrimps and small fish incautiously venturing too near these innumerable and invisible threads, and enabling the tentacles to seize and convey them to the central mouth. Similarly armed threads may also be projected from the sides of the body. The eggs are very numerous, being in bunches on the inside of the partitions until ready to be hatched, when they escape through the stomach and mouth, or through the tentacles, into the water, giving rise to creatures like themselves, only with fewer tentacles, which are in multiples of five. The young one has only five, one in the line of the mouth and the others in two pairs laterally; so that even here there is an indication of bilateral symmetry, with definition of anterior and posterior regions. The actinia is the type of the single polyp, as distinguished from the compound coral polyps. It preys voraciously on small crabs and mollusks, and when waiting for its victims these arms are expanded like the petals of a flower, and, being tinted with very brilliant colors, they present an elegant appearance. The actinia seizes animals apparently superior in strength and bulk, engulfs them in its sac or stomach, and distending itself to a great degree, digests them rapidly, disgorging the shells and harder parts of the victim when the softer parts have been consumed. Some actiniæ are fixed, and others are free. The external tunic of the body presents both longitudinal and transverse muscular fibres, covered by a layer of skin or mucous membrane. Nervous fibres have also been detected, and the sensibility of the animal is extreme; they contract even when a dark cloud passes over them. They may be seen at low water, clustered upon rocks and masses of stone, which they cover, as with flowers. There they remain tenaciously adhering by their base. They are, however, capable of moving from one spot to another; and in winter they seek deeper water, where the changes of temperature do not affect them.—The sea anemone is very common on the southern shores of England and on the New England coasts; and one species (*actinia Jordaica*), on the shores of the Mediterranean, is esteemed a great delicacy by the Italians. The fringed actinia (*metridium*), the most common on the N. E. coast of North America, is, in large specimens, about 4 inches high and 3 inches across the expanded disk. They are found of various colors, pink, brown, purple, whitish, and orange, in pools among the rocks, flooded at high tide, and overhung by seaweeds. In *anthea cereus*, of the British coast, there is no power of retracting the long tentacles within the body; the body is of a light chestnut color, and the numerous tentacles usually sea-green tipped with red. It is of about the size of our fringed actinia.—See "British Sea Anemones," by Philip Henry Gosse (London, 1860), and "Coral and Coral Islands," by James D. Dana (New York, 1872).

Anthea Cereus (Opelet).

ACTINISM (Gr. ἀκτὶς, a ray of light), the peculiar property or force of that portion of the sun's rays which produces the chemical effects shown in photography. That the actinic rays are different from those which produce heat and light was shown as far back as 1842 by Prof. J. W. Draper of New York, who recognized in them a new principle or force, for which he proposed the name of tithonicity, and for the rays that of tithonic. The name now adopted was given by Mr. R. Hunt of England. It is found that actinism does not exist in the most luminous rays of light, and that these rays actually tend to prevent the peculiar effects of this force upon inorganic matter. The quantity of actinism in the sun's rays varies with the time of day and with the seasons. It is intercepted by red, orange, and yellow glass; hence photographers now use glass of these colors to admit light to their so-called dark rooms. Such glass transmits the solar heat, while blue and violet glass, which transmit little or nothing of this heat, transmit the actinic rays. The reason of this has been explained by experiments in taking photographs of the solar spectrum; they proved that no actinism exists in the red, orange, and yellow rays, that it commences feebly in the green, becomes stronger in the blue, and is strongest in the violet; but what is remarkable, it is also found to extend far beyond the latter color, in the dark space entirely outside the visible spectrum. In photographing the spectroscopic lines, it is found that this dark space contains scores of them as well as the visible part of the spectrum, and it appears that the only reason that we do not see these ultra-actinic rays is that the liquids in our eyes cannot transmit waves of such great velocity; when this velocity is decreased by throwing the spectrum on some fluorescent substance, as paper, painted with a solution of quinine, or on uranium glass, the lines may be rendered visible. The so-called fluorescent substances reduce the velocity of the luminous waves falling on them; in fact, they emit luminous waves of a less velocity than those by which they are illuminated. Mr. Rutherfurd of New York has made the most elaborate photographs of all the lines in the actinic portion of the solar spectrum, the invisible as well as the visible, to the number of several thousand. A few of these lines are represented in the spectrum given here, of which only the portion from A to H is visible, while that from H to P is invisible, but may be photographed, even to a further extent than is here represented. The height of the unshaded curve below represents the intensity of the light in the corresponding portion above, while the height of the shaded curve represents the intensity of the actinic action. It is seen that while the strongest light is in the yellow between the lines D and E, there is a total absence of actinism here; the strongest actinism is found near the lines H, where there is scarcely any light left, so that the spectrum dwindles down in darkness at that spot, while this actinism extends about twice the length of the visible spectrum.—In regard to the asserted action of the actinic rays on germination and the growth of plants, the most conscientious experiments have proved that only darkness promotes germination, and that plants want for their growth not that light alone from which the heated rays have been eliminated by passing it through blue or violet glass. Such glass cannot increase the actinic power, but only decrease the light and heat, and experience has shown that most plants suffer decidedly by such treatment; that the green coloring matter of the leaves, of which the chlorophylline is the most important, needs the red rays for its promotion; and that all plants must, in order to prosper, have the benefit of the full unadulterated solar light.



Prismatic Spectrum of Solar Light.



Curves representing the comparative intensity of the luminous and actinic rays in different parts of the solar spectrum.

ACTINOMETER, the name generally but improperly applied to a thermometer intended to measure the heat of the solar rays. The first so-called actinometer was made by Sir John Herschel in 1825, and consisted of a thermometer with a large bulb filled with the blue solution of the ammonia sulphate of copper, enclosed in a box with plate glass on top. When exposed to the sun's rays the expansion of the liquid indicates their intensity. The instrument is nearly identical in its results with that of Pouillet, which he calls pyrheliometer. Recently an ordinary mercurial thermometer enclosed in a box, and used alternately in the shade and in sunshine, was described by the Rev. Mr. Hodgkinson under the name of actinometer.—A true actinometer is an instrument to measure the actinic or chemical power of the solar rays. The first contrivance to effect this object was the darkening of a surface sensitized by chloride of silver. The difficulty here was to make a preparation which was always uniformly sensitive. Dr. John W. Draper of New York discovered the important fact that of a mixture of equal volumes of chlorine and hydrogen, the amount combining to form chlorhydric acid is directly proportional to the actinic intensity of the light and the time of exposure. He made use of this property for the purpose of practical actinometry; while recently Bunsen and Roscoe have devised an actinometer based on the very same principle, and giving results of the most absolute scientific accuracy. There are, however, many other actions of this kind known in chemistry which may be more conveniently employed. A solution of chloride of gold and oxalic acid will remain clear in the dark, while gold is precipitated by exposure to actinic rays, the amount of gold being proportional to the intensity of the rays and the time of exposure. See "Philosophical Transactions," 1859, p. 879; 1852, p. 139.

ACTION, the formal demand of one's right from another in a court. In the Roman law action is defined to be either the right which one has of seeking in a judicial tribunal that which is his due, or the pursuit itself, or the exercise of the right. In our law the pursuit of the remedy is properly the action, and the right on which it rests is the cause of action. In its usual sense the word describes all the proceedings incident to the demand of the right, including the adjudication of the court upon it.—As actions are appeals to the supreme power of the state, to decide upon the matters in controversy between the parties, they are, except where recent reforms in procedure have changed the practice, commenced by writs issued out of courts, in the name of the sovereign, or of the judges as his representatives, calling upon the defendant to come into court and answer. Such writs still remain in many of the states and in most of the courts of the

United States. But in New York, and other states which have imitated its procedure, the action is commenced by a simple notice or summons signed by the plaintiff or his attorneys; though it is not to be understood that the theory of the action, as invoking or setting in motion the sovereign power of the state, is in any respect changed.—The New York code defines an action as an ordinary proceeding in a court of justice, by which one party prosecutes another party for the enforcement or protection of a right, the redress or prevention of a wrong, or the punishment of a public offence. This definition suggests the chief division of actions, namely, into civil and criminal actions. A civil action may be brought by a private person; but in criminal actions in the proper sense, namely, proceedings for the punishment of crimes, the state or the people, that is, the sovereign power, is the plaintiff or prosecutor. An individual can sustain an action which relates to a criminal offence only when he has suffered from it some injury peculiar to himself. Thus no private person, but only the people, can bring an action for a public nuisance; but if the public wrong inflicts a special injury on the individual, he may have his private action for that. In respect to the higher grades of criminal offences, it is the general principle at least of the law, though no very certain rule about the matter can be given, especially with reference to the American law, that the private remedy for the especial injury must be postponed until after the individual has done his duty to the public by setting afoot a public prosecution of the crime.—It is said, in general terms, that for every wrong the law provides a remedy by action; and, rightly understood, this is true. But there is not a remedy or action for every injury. It is only for those acts which are injuries in the estimation of the law, or, in other words, which are wrongs in a legal sense, that the law gives redress by actions. As the Latin phrase is, there may be *damnum absque injuria*, that is to say, damage or injury, but yet no legal wrong. So where the harmful act is done by one in the exercise of a function or authority conferred by the sovereign power, and within its limits, and without any fault on his part or for his personal benefit, no action lies against him for the injury. Thus no action will lie against a judge of a court of record for an act done by him in the exercise of his judicial office; and this is true even if he acts without jurisdiction in fact, unless he knew, or had the means of knowing and so ought to have known, the defect of jurisdiction; and it lies upon the plaintiff in any such case to prove these essential facts. This principle applies to the case of all persons intrusted with the performance of public duties or functions, and exercising them without any personal emolument, who, without malice, negligence, or other fault in the exercise of such duties, inflict injury upon individuals.—No action can be maintained by a citizen against a sovereign without its express consent; therefore, as a rule, no suit can be brought by an individual against the state or the United States. Causes of action against these must be presented by petition or some proceeding of that character. The United States receives demands of this character in its court of claims. Nor will the courts of a state ordinarily entertain actions against foreign states or sovereigns, for anything done or omitted by them in their public character. Claims of this sort are properly the province of diplomatic negotiation.—As injuries are numerous and various, so the character and forms of actions are manifold. Many of the old-fashioned forms, which made certain technical tests essential to their maintenance, have been wisely abolished. It has been attempted in New York to get rid of all distinctive forms. There, every other than a criminal action is a civil action. There is no other or specific name for it, and the design of the code is to give by this single action every kind of remedy or relief which can be sought in civil causes. But the characteristics of the old forms of actions remain, nevertheless, and as they must, they still determine the forms of the one action; so that its characteristic shapes are almost as numerous as the old forms of which it has extinguished the names.

ACTIUM (now *La Punta*), a promontory and village in Acarnania, at the entrance of the Ambracian gulf, near which Octavius, afterward Augustus, vanquished Mark Antony, Sept. 2, 31 B. C., in a great naval engagement which decided the question of universal dominion, and made the victor emperor. The generals had nearly equal armies on opposite sides of the bay, but these took no part in the combat. Octavius had 260 ships, Antony 220. Cleopatra reinforced Antony with 60 ships, and he imprudently offered a naval battle to Octavius. Agrippa, the admiral of Octavius, by a rapid manœvre, soon put to flight Cleopatra with her galleys. The voluptuous Antony followed her with a few ships. His fleet, deserted by its leader, surrendered, and his army did the like after waiting seven days for his return.

ACTON, Sir John Francis Edward, Neapolitan prime minister, born in 1736, died in Palermo, Aug. 12, 1811. He has been often erroneously called Joseph, the name of his brother. His immediate ancestors were London merchants, descendants of an English country gentleman, Edward Acton, who was created a baronet on account of his fidelity to Charles I. Sir John, who inherited the title in 1791, was in the naval service successively of France, Tuscany, and Naples, where he became a favorite of Queen Caroline, and rose rapidly to the post of premier of King Ferdinand. He had intimate relations with the English ambassador and his wife, Sir William and Lady Hamilton, and was an inveterate enemy of the French revolution. His administration was despotic and cruel. In 1798 he accompanied King Ferdinand in the expedition of the Austrian General Mack against the French. He lost his prestige after the disastrous result of the campaign, and was finally in 1806 ousted from power.—His second son, CHARLES JANUARIUS EDWARD (1803–'47), became a cardinal in 1842. Sir John's brother, JOSEPH EDWARD, was a lieutenant general in the Neapolitan service, and became the progenitor of several distinguished naval officers; and the Italian minister of marine in 1869–'70, Rear Admiral GEORGE ACTON, and several other officers of the present day, residents of Naples, are members of the same family. Sir John Francis Edward Acton was succeeded as 7th baronet by his son FERDINAND RICHARD EDWARD (1801–'37), who married in Paris in 1832 the only child of the duke of Dalberg, and assumed the name of Dalberg-Acton. His widow became in 1840 the wife of the present Earl Granville, and died in 1860.—Sir JOHN EMERIC EDWARD DALBERG-ACTON, born Jan. 10, 1834, studied from 1850 to 1854 at the university of Munich, made then with his stepfather Lord Granville a tour through the United States, and married in 1865 a daughter of Count Arco-Valley of Munich. He founded in 1861 the "Home and Foreign Review," an organ of the liberal Catholics, and edited in 1863 *Matinées royales*, a work ascribed to Frederick the Great, in regard to which there has been much controversy in Germany. In 1870 he took an active part in the Old Catholic movement, and has published in its support, in the German language, *Zur Geschichte des vaticanischen Concils* (Munich, 1871). He was in 1860 elected member of parliament for Carlow, Ireland; and again, as candidate of the liberal party, in 1865 for Bridgnorth, England. In 1869 he was made a peer as Baron Acton.

ACTON BURNELL, an English statute, so named because the parliament at which it was passed was held at Acton Burnell, a little village in Shropshire. The date of the statute is Oct. 12, 1283. It is the first statute passed in England enabling merchants to recover debts due to them, and is therefore often called *Statutum Mercatorum*, or statute of the merchants. By it the mayor or the sheriff might seize and sell the chattels and lands of the debtor, or, if he had no effects, might detain him in prison until the debt was paid, feeding him meanwhile on bread and water if he was too poor to support himself, maintenance money to be added to the original debt. The statute of Acton Burnell met with much opposition from the sheriffs. The Jews were excluded from the benefits of this liberal statute, which was passed to encourage the settlement of foreign merchants in England. Barrington states that a similar ordinance was not passed in France till 1536, in the reign of Francis I. The statute of merchants is considered an epoch in the social history of the middle class of England, and indicated their growing power.

ACTS OF THE APOSTLES, the fifth book of the New Testament, and the last of those properly historical. It is recognized on all sides that the Acts were written by the same author as the third Gospel, and the early tradition of the church was firm and constant in ascribing them to Luke. Schleiermacher regarded the book as an aggregate of various reports by different writers, and ascribed the most important of these works, the writer of which is characterized by the use of the word *we*, to Timothy. This view was supported by De Wette, Bleek, and other critics. Mayrhoff (1835) ascribed the whole book to Timothy, while Schwanbeck (*Ueber die Quellen der Schriften des Lukas*, 1847) assumed Silas to be the author. The authenticity and canonical character of the book was in the ancient church only denied by a few heretical sects, such as the Ebionites and Manichæans, whose objections were entirely of a dogmatical, not of an historical character. Chrysostom, however, complains that even in his time the book was not so much as known. In modern times the critics of the Tübingen school, in particular Baur, Zeller, and Schwegler, assumed the book to have been written in the course of the 2d century. Those who assert the authorship of Luke, including Renan, variously fix the time of writing between 58 and 80. The author clearly indicates that for the materials of the latter part of the book (xvi. 11 to xxviii. 31) he has drawn upon his own recollection or upon that of the apostle Paul. For the first part the author is believed by some writers of the critical school to have made use of older writings, and in particular of the apocryphal book entitled "Preaching of Peter."—As regards the design of the Acts, it has long been a prevalent opinion that Luke intended to follow up his history of the life of Christ by a narrative of the establishment and early progress of the Christian religion. The opinion of Hugo Grotius that this book was intended to trace the lives of the two chief apostles, Peter and Paul, has found many supporters among the theologians. According to Schneckenburger, whose *Ueber den Zweck der Apostelgeschichte* (1841) is the first important work on the subject from the standpoint of the critical German school, the author wished to write an apology of Paul against his Judaizing opponents, and to prove that he was in no point inferior to any of the other apostles, and in particular to Peter. This theory was somewhat modified by Baur, the chief of the Tübingen school, who undertook to show that the Acts had been compiled in the 2d century for the purpose of effecting a reconciliation of Petrine and Pauline Christianity. The most important work of the Tübingen school on the subject is that of Zeller, *Die Apostelgeschichte nach ihrem Inhalt und Ursprung kritisch untersucht* (1854), which regards the Acts as a book proceeding from the Pagan-Christian party, and intended to purchase the peace of the church by some concessions to the Judaizing Christians. The inspired character of the book has been defended against the Tübingen school by Lange, Thiersch, Ebrard, Schaff, and others; and even writers like Bleek, De Wette, and Renan defend the trustworthy character of the Acts as a work of history. The style is purer than that of most other books of the New Testament; the first part, however, contains a considerable number of Hebraisms. The Acts include the history of the Christian church from the day of Pentecost to the imprisonment of Paul at Rome. With regard to the dates of the principal events recorded, there is a wide difference of opinion. (See PAUL.) Besides the works on the Acts already mentioned, those by Lekebusch (*Die Composition und Entstehung der Apostelgeschichte*, 1854) and by Trip (*Paulus nach der Apostelgeschichte*, 1866) are of special importance.

ACUÑA, Cristobal de, a Spanish Jesuit missionary in Chili and Peru, born at Burgos in 1597. He was one of the early explorers of the Amazons, being attached to Texeira's expedition to that river (1639-'41), with the special object of reporting the incidents of the exploration. Acuña returned to Spain with an interesting narrative of it, which he published at Madrid; but the distraction of the country prevented the government from taking any interest in the colonization of the region to which so much energy and talent had been devoted. He once more went to South America, and died on a journey from Panama to Lima.

ACUPUNCTURE (Lat. *acus*, a needle, and *pungere*, to prick), an operation introduced by the Chinese, who imagine that it gives vent to acrid vapors. The needles employed by them are of gold or silver, manufactured under special license from the emperor, and their use forms a distinct branch of medical practice. Introduced into Europe in the early part of this century, the operation is now but seldom performed except to give issue to fluids in dropsy, &c. It is advocated by some in the treatment of neuralgia, especially sciatic, and in muscular rheumatism, acting in these cases as a counter-irritant. The needles used are of steel, 2 to 4 inches long. Usually but one is inserted, though sometimes as many as 20 or 30. They are introduced to a depth of one to two inches by simple pressure, by pressure with rotation, or by percussion. The length of time during which they are allowed to remain varies from a minute to several days. Instances are known where they have been passed with impunity through vital organs. Infanticide by acupuncture of the brain or spinal cord is a well recognized crime.

ADA, a S. W. county of Idaho, separated from Oregon by the Snake river (here also called the Saptin); area, about 2,800 sq. m.; pop. in 1870, 2,675. The county was organized in 1864. Mining is the principal occupation of the people. The total value of property in 1869 was $1,014,185. There are three newspapers. Capital, Boisé City, which is also the capital of the territory.

ADAIR. I. A S. county of Kentucky, intersected by Green river; area, 450 sq. m.; pop. in 1870, 11,065, of whom 1,836 were colored. The surface is hilly and abounds in good timber, and the soil is moderately fertile. The productions in 1860 were 29,513 bushels of wheat, 413,205 of corn, 24,195 of oats, and 767,395 lbs. of tobacco. Water power is abundant and several manufactories are in operation. Capital, Columbia. **II.** A N. N. E. county of Missouri, intersected by Chariton river; area, 570 sq. m.; pop. in 1870, 11,448, of whom 143 were colored. The land is undulating prairie, suited to the production of grass and grain. In 1860, 554,835 bushels of corn and 84,353 lbs. of tobacco were produced. Capital, Kirksville. **III.** A S. W. county of Iowa; area, 576 sq. m.; pop. in 1870, 3,982. Middle river, an affluent of the Des Moines, and the head streams of Nodaway river, run through it. The state road from Fort Des Moines to Council Bluffs also traverses the county. Capital, Fontanelle.

ADAIR, Sir Robert, a British diplomatist, born in London, May 24, 1763, died Oct. 3, 1855. His father, Robert Adair, was sergeant-surgeon to George III. He was distantly related to Charles James Fox, and was early destined for a political career. He entered parliament in 1802, and was a strenuous supporter of whig politics. In 1806 Mr. Fox sent him as ambassador to Vienna, and in 1808 Mr. Canning, although opposed to him in politics, sent him on a special mission to Turkey, where he negotiated the treaty of the Dardanelles, concluded in 1809. He remained at Constantinople till 1811, having been appointed ambassador in 1809. Sir Robert Adair afterward remained out of office till 1831, when Lord Grey sent him to Belgium, soon after the erection of that country into a kingdom, and he was prominent in negotiating peace. He retired from this mission with the rank of privy councillor in 1835. He left memoirs of his residence at St. Petersburg and Vienna, written at the age of 82.

ADAL, or **Adel**, a portion of the E. coast of Africa, between the Abyssinian highlands and the Red sea, and extending from the bay of Tajurra to Cape Bab-el-Mandeb, and from thence 300 m. along the shore of the Red sea to the town and harbor of Massowah; lat. 11° 30′ to 15° 40′ N. It is inhabited by the Danakil or Affar, a Mohammedan nation, from the most famous tribe of which, Ad Alli or Adaiel, its name is derived. The territory of Adal varies from 120 m. wide at the bay of Tajurra, to only 40 m. opposite Annesley bay. There is a low tract along the coast, which rises gradually to a height of 2,000 feet above the sea in a distance of 25 or 30 m., and then the ascent is very rapid to the table land of Tigré. On the highest terraces durra and barley are cultivated in small patches. Camels, mules, asses, goats, and sheep abound, the pasturage is generally good, and large quantities of butter are annually sent to Massowah, and thence to Arabia. Wild animals are numerous, and even the lion and elephant are occasionally seen. A large plain, called Harho, is covered with salt three feet thick, which is not only used for culinary purposes, but in Abyssinia as a currency. Adal is peopled by many tribes, which appear to belong to the same stock. They are of a dark brown color, muscular and full in body, with roundish face, thick crisp black hair, lively eyes, lips thinner than those of the negroes, and short straight nose, divided from the forehead by an indentation. They all live a nomadic life, travelling with their flocks and herds from pasture to pasture. The sultan of the Adaiel resides at Tajurra, and the sultan of the Mudaito Danakil at Aussa, near the Hawash, 80 m. W. by S. of Tajurra. Salt is the only commodity exported.

ADALBERT. I. Or **Aldebert,** a Frankish bishop and missionary to the German pagans before the middle of the 8th century. He was accused of heresy by St. Boniface, who charged him among other things with collecting his own hair and nails as relics. He was condemned by a synod held in 745, and died in prison. His disciples were styled Adalbertines, or Aldebertines. **II. Saint,** of Prague, "the apostle of the Prussians," died in 997. He was educated by the celebrated Otherich at Magdeburg. In 983 he was chosen bishop of Prague. Discouraged at his failure to convert the Bohemians, he repaired to the monastery of St. Alexius at Rome. In 993 he was recalled to his bishopric, but after two years became again disgusted and left. In 995 he baptized the future St. Stephen and first king of the Hungarians at Gran. He subsequently went to Poland, and thence to Prussia, to convert the heathen, by whom he was murdered. **III.** Archbishop of Bremen and Hamburg, died at Goslar, March 17, 1072. He received his office in 1043 from Henry III., whom in 1046 he accompanied to Rome. There he was a candidate for the papal throne, and barely failed in the election. Pope Leo IX., in whose behalf he had spoken in the synod at Mayence in 1049, made him in 1050 his legate in the north. During the minority of the emperor Henry IV. he usurped, together with Archbishop Hanno of Cologne, the administration of the empire. He became so obnoxious to the German princes, that in 1066 they forcibly separated him from the emperor; but in 1069 he regained his power, and kept it till his death.

ADALBERT, Heinrich Wilhelm, a Prussian prince, first cousin of the emperor William, commander-in-chief of the German navy, born Oct. 29, 1811, died June 6, 1873. He travelled in Europe, the East, and Brazil, and printed privately *Aus meinem Reisetagebuch* (Berlin, 1847), which was translated into English (London, 1848). He held high military rank, but devoted himself to naval affairs, and in 1854 was made admiral. In 1856 he commanded the Prussian corvette Danzig on the expedition against the Riff pirates; but as the Prussians numbered only 90 and the pirates 500, he was obliged to retire, losing 24 killed and wounded, and being himself shot through the thigh. In 1864, during the Danish war, he cruised with his fleet in the Baltic, and at its close he was appointed commander-in-chief of the national navy. In 1870 he visited the English seaports with a squadron. During the Franco-German war his ships took refuge in Wilhelmshaven, and he observed the war at the German headquarters.—His wife, THERESA ELSSLER, sister of the celebrated Fanny, and herself a skilful dancer, received the title of baroness von Barnim on his morganatic marriage with her in 1850. The only offspring of this union, Baron ADALBERT VON BARNIM, born in 1841, died July 12, 1860, in Egypt. The scientific observations made during his journey to that country were published after his death by Dr. Hartmann, his physician (*Reise des Freiherrn A. von Barnim durch Nordost-Afrika*, Berlin, 1863).

ADALIA, or **Sattalieh** (anc. *Attalia* in Pamphylia), a seaport and the largest town on the S. coast of Asia Minor, on the gulf of Adalia, 250 m. S. E. of Smyrna; pop. about 12,000, of whom 3,000 are Greeks. It is the capital of a pashalic. The town is built in the form of an amphitheatre, the ground rising to the height of about 70 feet above the sea, and is surrounded by a double wall with square towers about 50 yards apart. The chief trade is in wool, cotton, and opium. There are some important ancient remains.

ADAM, the first man, the husband of Eve, and father of Cain, Abel, and Seth, and of unnamed "sons and daughters." Various meanings have been ascribed to the name; the most generally recognized is earth-born. The history of Adam, in common with that of the whole antediluvian world, as contained in Genesis, is by some treated as an allegory, intended to convey to an uncultured people an intelligible idea of the world's creation, and to explain some of the momentous questions involved in this earthly being. Others contend for a literal interpretation of the narrative. For Swedenborg's doctrine on the subject, see NEW JERUSALEM CHURCH.

ADAM, Adolphe Charles, a French composer, born in Paris, July 24, 1803, died May 3, 1856. In 1817 he entered the conservatory in Paris, became a skilful pianist, and studied composition under Reicha and Boieldieu. His earliest compositions were fantasias and variations for the pianoforte. He wrote the opera of *Pierre et Catherine* (1829), and in 1832 composed a ballet for London. His most important work is the opera *Le Postillon de Longjumeau* (1836). His *Souvenirs d'un musicien*, with his autobiography, was published in 1857.

ADAM, Albrecht, a German painter of battle pieces, born at Nördlingen, April 16, 1786, died in Munich, Aug. 28, 1862. He studied painting at Nuremberg under Conrad Zweiger. He was engaged in the Austrian campaigns against Napoleon, and subsequently entered the service of Eugene Beauharnais, viceroy of Italy, and painted the battle scene of Lobau. He accompanied Eugene in the campaign of 1812 as far as Moscow. After the peace he prepared a series of drawings illustrative of Eugene's military career, now in the Leuchtenberg gallery, St. Petersburg. He also painted several grand battle pieces, besides his *Voyage pittoresque militaire* in 120 lithographs, illustrating the Russian campaign. He finally settled in Munich, under King Louis, for whom he painted the battle of the Moskva.

ADAM, Alexander, a Scottish teacher and grammarian, born in Murrayshire in June, 1741, died Dec. 18, 1809. He acquired learning amid difficulties, and in 1768 was appointed rector of the high school of Edinburgh, which office he filled for 40 years. He wrote "Principles of Latin and English Grammar," "Roman Antiquities," "Summary of Geography and History, both Ancient and Modern," and "Classical Biography," all of which were long in general use in Europe and America.

ADAM OF BREMEN, a German missionary and chronicler, from 1067 canon and schoolmaster at Bremen, died there about 1076. He is the author of *Historia Ecclesiastica*, which is the principal literary authority respecting the northern nations of that period. It is also called *Gesta Hammaburgensis Ecclesiæ Pontificum*, from containing a chronological record of the episcopal see of Hamburg from 788 to 1072. A part of his materials was furnished by King Sweyn Estrithson (1047–'76) of Denmark. His MS. was first discovered in a Danish monastery, and published at Copenhagen in 1579. An improved and enlarged edition forms the 9th volume of Pertz's *Monumenta Germaniæ Historica*, and this became the basis of Laurent's German translation (Berlin, 1850). Adam also wrote *De Situ Daniæ* (Stockholm, 1615; Hamburg, 1706; German, Bremen, 1825). Asmussen published at Kiel, in 1834, *De Fontibus Adami Bremensis*.

ADAM DE LA HALLE, a trouvère of the 13th century, died at Naples about 1286. He was born at Arras, a town celebrated for its poets and minstrels, and was surnamed the Hunchback of Arras. He went to Naples in the suite of Robert II., count of Artois, in 1282. His pieces were not merely songs, but of a dramatic character, and he may be considered one of the founders of the French drama. His works have been published in various collections.

ADAMAWA, the Mohammedan name, while Fumbina is the pagan one, of a country of central Africa visited and described for the first time by Dr. Barth in the summer of 1851. It lies between lat. 6° 30′ and 11° 30′ N., and lon. 11° and 16° E. It is about 200 m. long from S.W. to N.E.; its breadth seldom exceeds 70 m. Its capital is Yola, near the N.W. border, a city of about 12,000 inhabitants, where the governor, who owes allegiance to the Foolah sultan of Sackatoo, resides. It is a Mohammedan sub-kingdom engrafted upon a mixed stock of pagan tribes, the conquest of the valorous and fanatic Foolah chieftain Adama (whence the name Adamawa) over the great pagan kingdom of Fumbina. The governor at the time of Barth's visit was Adama's son. The native inhabitants were, however, far from being wholly subdued, several districts (especially that about Mount Alantika, 40 m. S. of Yola) being still quite independent and constantly at war. It is one of the finest countries of central Africa, irrigated by numerous rivers, such as the Benuwe, or left branch of the Quorra or Niger, and the Faro, and diversified with hill and dale. In general it is flat, rising gradually toward the south to 1,500 feet or more, and broken by separate hills or extensive groups of mountains. The grain commonly grown in the country is the *holcus sorghum*. Meat is so dear that a goat will often bring the price of a female slave. Ground nuts are plentiful. The elephant is exceedingly frequent. The most singular animal is the *ayu*, a mammal resembling a seal, living in the river, and feeding by night on the fresh grass on the river banks. There is an indigenous variety of ox, but quite a distinct species, not three feet high, of a dark gray color, called *muturu*. Excellent iron is found. The standard of value is the native cotton, woven in narrow strips called *leppi*, of about 2¼ inches in width. Soap is a very important article in any country inhabited by the Foolahs, and it is prepared in every household. The Mohammedan population dress both well and decently. The pagans wear simply a narrow leathern strap between their legs and fastened on their loins. There are several Arab colonies, and Arab architects are employed by the governor. Slavery exists on an immense scale, and many private individuals own more than 1,000 slaves. The governor of Yola, who calls himself a sultan, receives every year in tribute, besides horses and cattle, 5,000 slaves. (See FOOLAHS.)

ADAMITES, a sect of the second century, who held that the merits of Christ restored them to Adamic innocence. Consequently, they appeared naked in their assemblies, and rejected marriage. They soon disappeared, but were revived in the 12th century by Tanchelin at Antwerp, who taught that fornication and adultery were meritorious, and indulged in the most disgusting brutalities in open day. One Picard also revived the sect in Germany at the beginning of the 15th century. It took root in Bohemia, where, in spite of many persecutions, it has from time to time reappeared.

ADAMS, the name of eight counties in the United States. **I.** A S. county of Pennsylvania, on the Maryland border; area, 530 sq. m.; pop. in 1870, 30,315. The head waters of Monocacy river take their rise in this county, and small creeks abound. Along the S. border a ridge called South Mountain extends, and the general surface of the county is uneven. In the South Mountain, copper and

Potomac marble are found, and the copper mines have been worked with some success. In 1870 the personal property was valued at $1,287,541. The crops in 1870 amounted to 494,346 bushels of wheat, 757,019 of corn, 636,828 of oats, 83,425 of rye, and 1,005,303 of potatoes. The value of animals slaughtered was $498,545. The county has numerous manufacturing establishments. Capital, Gettysburg. **II.** A S.W. county of Mississippi, bounded W. by the Mississippi river, which separates it from Louisiana, and S. by the river Homochitto; area, 440 sq. m.; pop. in 1870, 19,084, of whom 14,287 were colored. The land is highly productive. The productions in 1870 were 177,307 bushels of corn, 26,469 of sweet potatoes, 20,140 bales of cotton, and 3,144 tons of hay. Capital, Natchez. **III.** A S. W. county of Ohio, separated from Kentucky by the Ohio river; area, 500 sq. m.; pop. in 1870, 20,750. The surface is hilly and well timbered, and the soil is fertile, and especially adapted to fruit culture. The productions in 1870 were 162,677 bushels of wheat, 156,073 of oats, 4,376 of barley, 2,128 of rye, 772,899 of corn, 39,542 of potatoes, 54,208 lbs. of wool, 434,664 of butter, and $100,828 worth of orchard products. There were 16,333 sheep and 20,352 hogs, and the value of animals slaughtered was $308,186. In the S. E. part of the county, near the river, are valuable quarries and iron mines. Capital, West Union. **IV.** An E. county of Indiana, bordering on Ohio; area, 324 sq. m.; pop. in 1870, 11,382. It is drained by the Wabash and St. Mary's rivers. Forests of oak, beech, ash, hickory, and elm cover a large portion of the county. The soil is productive and the surface nearly level. The productions in 1870 were 172,331 bushels of wheat, 96,168 of corn, 88,697 of oats, 12,408 tons of hay, 227,303 lbs. of butter, 32,847 of cheese, and 62,957 of wool. Capital, Decatur. **V.** A W. county of Illinois, separated from Missouri by the Mississippi river; area, 760 sq. m.; pop. in 1870, 56,362. The Quincy and Eastern and the Quincy and Chicago railroads run through the county, and the Illinois and Southern Iowa railroad forms a junction with the Quincy and Eastern within its limits. Bear creek, an affluent of the Mississippi, drains the N. W. part. The surface is undulating and covered with forests, the soil rich and to a great extent cultivated. The products in 1870 were 1,452,905 bushels of corn, 963,807 of wheat, 759,074 of oats, and 104,855 lbs. of wool. There were 26,949 sheep and 56,442 hogs. Value of animals slaughtered, $1,103,518. There are many manufacturing establishments. Capital, Quincy. **VI.** A S. W. county of Iowa; area, 432 sq. m.; pop. in 1870, 4,614. It is drained by the Nodaway river and several of its head streams. The Burlington and Missouri River railroad runs through it. In 1870 the county produced 60,716 bushels of wheat, 253,261 of corn, 40,827 of oats, and 16,905 lbs. of wool. Capital, Quincy. **VII.** A S. central county of Wisconsin, bounded W. and S. W. by the Wisconsin river, and drained by its affluents; area, 650 sq. m.; pop. in 1870, 6,601. Large forests cover the county, and large quantities of lumber are cut and rafted down the Wisconsin. Water power is abundant. The products in 1870 were 123,454 bushels of wheat, 114,320 of corn, 88,831 of oats, and 60,701 of rye. Capital, Quincy. **VIII.** A new county in S. Nebraska, bounded N. by the Platte river and drained by the Little Blue; pop. in 1870, 19.

ADAMS, a township of Berkshire county, Mass., on both sides of the Hoosac river; pop. in 1870, 12,090. There are four villages in the town: North Adams, South Adams, Maple Grove, and Blackington. In its vicinity are a notable natural bridge across Hudson's brook, and Saddle mountain or Mt. Greylock, which has an elevation of 3,600 feet, and is the highest point in Massachusetts. The western terminus of the Hoosac tunnel is at North Adams, and the Troy and Boston and Pittsfield and North Adams railroads terminate here. Manufactures form the leading interest. In 1865 there were in the town 11 cotton mills, with 45,072 spindles, employing 332 males and 429 females; 6 woollen mills, with 44 sets of machinery, employing 440 males and 392 females; 2 print works, printing 8,925,000 yards of calico yearly, and employing 150 males and 21 females; 4 balmoral-skirt factories, and 2 paper mills. Two weekly newspapers and a semi-monthly are published in North Adams. The experiment of Chinese labor has recently been successfully made in North Adams. In 1870 there were 75 Chinamen employed in that village in the manufacture of boots and shoes. By the contract made in San Francisco, the Chinamen were engaged for three years. They are represented as being of quiet habits, industrious, skilful, and eager to learn in the evening schools provided for them. The town contains 35 schools, of which two are high schools.

ADAMS, Charles Baker, an American chemist and zoölogist, born in Dorchester, Mass., Jan. 11, 1814, died in St. Thomas, Jan. 19, 1853. He graduated at Amherst college, and was associated with Professor Edward Hitchcock in a geological survey of New York. In 1837 he became tutor in Amherst college, and in 1838 was chosen professor of chemistry and natural history in Middlebury college, Vt., but in 1847 returned to be a professor at Amherst. In 1845, 1846, and 1847 he was engaged in a geological survey of Vermont. Between 1844 and 1851 he made journeys to Jamaica and other parts of the West Indies, for scientific purposes. He wrote "Contributions to Conchology," "Monographs of Several Species of Shells," and other treatises. Not long before his death he published a useful work on elementary geology, in which he was assisted by Professor Gray of Brooklyn.

ADAMS, Charles Francis, an American statesman, the only child of John Quincy Adams who survived him, born in Boston, Aug. 18, 1807. At the age of two years he was taken by his father to St. Petersburg, where he passed the next six years and learned to speak Russian, German, and French. In February, 1815, he made the journey with his mother in a private carriage from St. Petersburg to Paris, to meet his father there—in the then disturbed state of Europe no slight undertaking. He accompanied his father on his mission to England, and being placed at a boarding school, according to the fisticuff usages then if not still in vogue in English schools, he was obliged to fight his English schoolfellows in defence of the honor of America. In 1817 he returned with his father to America, and was placed in the Boston Latin school, whence he entered Harvard college, where he graduated in 1825. The next two years he passed at Washington with his father, who was then president, but in 1827 returned to Massachusetts and pursued the study of the law in the office of Daniel Webster. In 1828 he was admitted to the Boston bar, but never has engaged actively in practice. In 1829 he married the youngest daughter of Peter C. Brooks, a Boston merchant—a connection which also made him a brother-in-law of Edward Everett. The next year he was nominated a representative from Boston to the Massachusetts legislature, but declined. This did not please his father, in consequence of which he accepted the nomination the next year, and served in the house for the succeeding three years, when he was transferred to the senate, in which he served two years. By this time Mr. Adams began to differ on several points with the leaders of the whig party, with which he had hitherto acted. In 1848 he was selected by the newly organized free-soil party as their candidate for the vice-presidency, along with ex-president Van Buren as candidate for the presidency. In the autumn of 1858 he was chosen a representative to Congress by the third district of Massachusetts, and took his seat in December, 1859. He was a member of the joint committee on the library, and chairman of the house committee on manufactures, which latter had but little to do, the time and thoughts of members being occupied with more exciting subjects. Mr. Adams watched with careful attention the course of events, and on the last day of May, 1860, addressed the house in a forcible speech, vindicating the policy of the republican party. In the interval between the two sessions of his congressional service, Mr. Adams, in company with Mr. Seward, made a journey in some of the northwestern states, and made several speeches in support of Mr. Lincoln for the presidency. On the day after the meeting of the second session of the thirty-sixth congress, so much of the president's message as related to the condition of the country was referred to a special committee of one from each state. Mr. Adams was the member for Massachusetts. This committee finally reported a series of resolves disavowing on the part of the free states any right to interfere with slavery in the slave states; a bill for the admission of New Mexico, leaving it to the inhabitants to allow or exclude slavery as they might decide; and an amendment to the constitution forbidding all interference on the part of congress with slavery in these states. The bill for the admission of New Mexico was rejected, but the other two measures were passed in the house by large majorities. Mr. Adams supported them all, and gave his reasons for so doing in a speech delivered Jan. 31, 1861. In 1861 he was appointed by President Lincoln minister to England, in place of Mr. Dallas. Mr. Adams arrived in London and assumed his duties about the middle of May. These duties were most arduous. With a few exceptions, the feeling alike of the ruling and the commercial classes of England was either unfriendly to us or indifferent. Mr. Adams had to maintain the rights of his country with unbending firmness, and at the same time to keep his spirit under perfect rule, as any explosion of ill temper or any expression of irritation would have been turned to the disadvantage alike of himself and his country. In the many discussions he had with the British ministry he showed a complete knowledge alike of international law and of the history of his own country, as well as discretion, tact, and good temper. His influence as a public man was increased by his social qualities, his agreeable conversation, and his familiarity with the whole range of English literature. When in 1868, after an absence of seven years, he returned home, Mr. Adams left England with the respect of every man who had been brought into official relations with him, and with a large amount of warm personal regard. In December, 1870, he pronounced before the New York historical society a discourse on American neutrality, which has been printed. Upon the ratification by England and America of the treaty of Washington for the settlement of the claims of each country against the other growing out of the civil war, Mr. Adams was selected by the president as the American arbitrator, and upon that duty sailed for Europe in November, 1871.—Mr. Adams has been a contributor to the "North American Review" and the "Christian Examiner," and between 1845 and 1848 was the editor of a political daily paper at Boston, by which he contributed to prepare the way for the present republican party. He is principally known, however, as the editor of his grandfather's collected writings, published in ten volumes, the first volume containing a life of John Adams written by him. The same duty which Mr. Adams has performed for his grandfather, he intends to perform for his father, for the execution of which he possesses abundant and most valuable materials.—**John Quincy**, eldest son of the preceding, a lawyer and politician, born in

Boston, Sept. 22, 1833. He was fitted for college at the Latin school, and graduated at Harvard college in 1853. In 1855 he was admitted to the bar, and has ever since had a moderate professional practice, principally in Quincy, his place of residence. He was an earnest republican during the civil war, and served on Gov. Andrews's staff. In 1866 he was chosen representative to the legislature from the town of Quincy. In 1867, having avowed his adhesion to the policy of President Johnson, he was nominated for reëlection by the democrats and defeated. The same year he was also the democratic candidate for governor of Massachusetts, with the same result. In 1869 he was again chosen to the legislature, and for the third time in 1870. In the autumn of 1871 he was an unsuccessful candidate for the offices of governor and representative. In the course of his public career Mr. Adams has had occasion to make many speeches, which were remarkable for manly independence and vigorous statement. In the Massachusetts house of representatives, as leader of a hopeless minority, he secured in a high degree the respect of his political opponents. — **Charles Francis, Jr.,** brother of the preceding, born in Boston, May 27, 1835, graduated at Harvard college in 1856, studied law, and was admitted to practice in 1858. At the breaking out of the war of secession he obtained a commission in the first regiment of Massachusetts cavalry, and served throughout the war. He was successively promoted to the rank of captain, lieutenant colonel, and colonel, and led his regiment, the fifth Massachusetts cavalry (colored), into Richmond, April 3, 1865, when that city was occupied by the United States troops. In July, 1865, he was mustered out of service with the brevet rank of brigadier general. Upon his return to civil life he became an active contributor to the "North American Review," writing chiefly on topics connected with the development of the railroad system. In 1869 he was appointed a member of the board of railroad commissioners of Massachusetts. In 1871, in connection with his brother, Prof. Henry Brooks Adams, he published a collected volume of writings under the title of "Chapters of Erie, and other Essays." — **Henry Brooks,** brother of the preceding, and third son of Charles Francis Adams, born in Boston, Feb. 16, 1838, graduated at Harvard college in 1858. He resided in London as his father's private secretary during the latter's term of service as minister to England. In 1870 he was appointed assistant professor of history in Harvard college and became editor of the "North American Review."

ADAMS, Edwin, an American actor, born in Medford, Mass., Feb. 3, 1834, died in Philadelphia, Oct. 25, 1877. He made his first appearance in Boston, and acted in many parts of the United States, acquiring a considerable reputation both as a light comedian and a personator of serious characters. During the season of 1869–'70 he acted in conjunction with Edwin Booth in New York in several of Shakespeare's plays.

ADAMS, Hannah, one of the earliest female writers in America, born at Medfield, near Boston, in 1755, died at Brookline, Mass., Nov. 15, 1832. She showed at an early age a fondness for study, and acquired a knowledge of Greek and Latin from some divinity students boarding with her father. During the revolutionary war she supported herself by making lace, and afterward by teaching. Her "View of Religious Opinions" (1784) and her "History of New England" (1799) were both successful. Her next work was "Evidences of Christianity" (1801). Her writings brought her little pecuniary profit; yet they secured her many friends, among them the Abbé Grégoire, with whom she carried on a correspondence, through which he aided her in preparing her "History of the Jews" (1812). During the closing years of her life she enjoyed an annuity provided by some friends in Boston. She was the first person whose remains were interred in Mt. Auburn cemetery.

ADAMS, John, second president of the United States, born Oct. 19, 1735 (O. S.), in that part of the town of Braintree, Mass., on the S. shore of Boston harbor, and some ten miles distant from Boston, which has since been erected into the town of Quincy, where he died, July 4, 1826. He was great-grandson of Henry Adams, who emigrated from England about 1640, with a family of eight sons, becoming one of the early settlers in Braintree, where he had a grant of 40 acres of land. The father of John Adams, a deacon of the church and selectman, was a farmer of limited means, to which he added the business of shoemaking. He was enabled, however, to give a classical education to his eldest son John, who graduated at Harvard college in 1755, and at once took charge of the grammar school in Worcester, Mass. The war with France for the possession of the western country was then at its height; and in a remarkable letter to a young friend, which contains some curious prognostications as to what would be in a hundred years the relative population and commerce of England and her colonies, young Adams describes himself as having turned politician. His school he found but "a school of affliction," from which he endeavored to gain relief by devoting himself, in addition, to the study of the law. For this purpose he placed himself under the tuition of the only lawyer of whom Worcester, though the shire town of the county, could then boast. He had thought seriously of the clerical profession, but, according to his own expressions in a contemporary letter, "the frightful engines of ecclesiastical councils, of diabolical malice, and Calvinistic good nature," of the operation of which he had been a witness in some church controversies in his native town of Braintree, had "terrified him out of it." Already he had longings for distinction. Nothing but want of interest and patronage prevented him from enlisting in the army. Could he have obtained a troop of horse, or a company of foot, he would, so one of his published letters declares, infallibly have been a soldier. After two years' study at Worcester he returned to his father's house in Braintree, and in 1758 commenced life in Suffolk county, of which Boston was the shire town. He gradually introduced himself into practice, and in 1764 married Abigail Smith, a daughter of the minister of the neighboring town of Weymouth, and whose connections occupied a social position superior to that of Mr. Adams's own family. What was still more to the purpose, she was a lady of superior abilities and good sense, and admirably adapted to make him happy. Very shortly after his marriage, the attempt at parliamentary taxation diverted him from law to politics. He promoted the call of a town meeting in Braintree, to instruct the representatives of the town on the subject of the stamp act; and the resolutions which he presented at this meeting were not only voted by the town, but attracted great attention throughout the province, and were adopted word for word by more than forty different towns. Yet Adams, as appears by his published diary, was somewhat alarmed at the violence of the mob in destroying the furniture of Oliver, the stamp distributor, and of Governor Hutchinson, and not a little vexed, as well as alarmed, at the interruption to his own business caused by the refusal of the judges to go on without stamps. He was somewhat consoled, however, by an unexpected appointment on the part of the town of Boston to be one of their counsel along with Jeremiah Gridley, the king's attorney and head of the bar, and James Otis, the celebrated orator, to support a memorial addressed to the governor and council that the courts might proceed with business, though no stamps were to be had. It fell to Adams, as junior counsel, to open the case for the petitioners, and he boldly took the ground—in which his two seniors, the one from his position, the other from his committals in his recently published book on the "Rights of the Colonies," were prevented from following him—that the stamp act was absolutely void, parliament having no right to tax the colonies. Nothing, however, came of this application; the governor and council declined to act, on the ground that it belonged to the judges, not to them, to decide. The repeal of the stamp act soon put an end to the suspension of business, which indeed had only extended to the superior court, the inferior courts going on without stamps. It was on this same occasion that Mr. Adams first made his appearance as a writer in the "Boston Gazette." Among other papers of his was a series of four articles, which were republished in a London newspaper, and subsequently in a collection of documents relating to the taxation controversy, printed together in a volume. The papers as originally published had no title; in the printed volume they were called an "Essay on the Canon and Feudal Law." They began indeed with some reference to these subjects, but might with much more propriety have been entitled an "Essay on the Government and Rights of New England." Mr. Adams's style was formed, as is evident from these pieces, from the moment he began to write. They may be found in his collected works, edited by his grandson. Mr. Adams's law business continued gradually to increase, and in 1768 he removed to Boston. In that and the next year he was one of the committee to draft instructions to the representatives of the town—a duty which the committee intrusted to him, though he refused to attend and speak at town meetings. In 1770 he was chosen a representative to the general court, notwithstanding he had just before accepted a retainer to defend Captain Preston and his soldiers for their share in what was known as the "Boston Massacre"—a defence conducted with success, in spite of the strong prejudices which it had to encounter. Adams's duties as representative interfered greatly with his business as a lawyer, on which he depended for support, and which by this time had grown to be greater than that of any other lawyer in the province. But he entered with his customary energy upon his new office, becoming the chief legal adviser of the patriot party, and now for the first time an active and conspicuous leader among them. Partly perhaps to escape this leadership, and the loss of time, the labor, and responsibilities which it imposed, as well as to regain his health, which began to suffer, Mr. Adams removed his residence back to Braintree, resigning his seat in the legislature, but still retaining his law office in Boston. A comparative lull in politics for two or three years made his presence in the legislature less indispensable, but still as to all the most important matters of controversy with Governor Hutchinson he was consulted and gave his aid. Indeed, it was not long before he again moved back to Boston, though still resolving to avoid politics and to devote himself to his profession. He wrote soon after a series of letters in a newspaper (republished in his collected works, vol. iii.) on the then mooted question of the independence of the judiciary, and the payment by the crown of the salaries of the judges. Soon afterward he was elected by the general court to the provincial council, but was negatived by Governor Hutchinson. The destruction of the tea and the Boston port bill, that followed, soon brought matters to a crisis. These events produced the congress of 1774. Mr. Adams was chosen one of the five delegates from Massachusetts, and his visit to Philadelphia on this business was the first occasion of his going beyond the limits of New England. In the discussions in the committee on the declaration of colonial rights, he took an active part in favor of resting those rights upon the law of nature as well as the law of England; and after the substance of the resolutions had been agreed upon, he was appointed to put them into shape. In his diary, published in the second volume of his collected works, and his contemporaneous letters written to his wife and published by his grandson, the most trustworthy and graphic descriptions are to be found of the members and doings of that famous but little known body. The session concluded, Mr. Adams left Philadelphia with no expectation, as he said at the time, of ever seeing it again. Immediately on his return to Massachusetts he was chosen by the town of Braintree a member of the provincial congress then in session. That congress had already appointed a committee of safety, vested with general executive powers; had seized the provincial revenues; had appointed general officers, collected military stores, and taken steps toward organizing an army of volunteer minutemen. Governor Gage had issued a proclamation denouncing these proceedings, but no attention was paid to it. Gage had no support except in the five or six regiments which formed the garrison of Boston, a few trembling officials, and a small minority of timid adherents; while the recommendations of the provincial congress had, by the common consent of the people, all the force of law. Shortly after the adjournment of this congress, Adams applied himself to answering through the newspapers a champion of the mother country's claim, who, under the *nom de plume* of "Massachusettensis," had commenced a series of able and effective papers in a Boston journal, and to whom Adams replied under the signature of "Novanglus." These essays appeared weekly during the winter of 1774–'5, but were cut short by the battle of Lexington. An abridgment of them was published in Almon's "Remembrancer" for 1775, under the title of "A History of the Dispute with America," and afterward in a separate pamphlet. They have also been twice reprinted entire in America, and are given in the 4th volume of Adams's collected works. Their value consists in the strong contemporaneous view which they present of the origin of the struggle between the colonies and the mother country, and of the policy of Bernard and Hutchinson as governors of Massachusetts, which did so much to bring that struggle on. Like all Mr. Adams's writings, they are distinguished by a bold tone of investigation, a resort to first principles, and a pointed style; but, like all his other writings, having been produced piecemeal and on the spur of the moment, they lack order, system, polish, and precision. In the midst of the excitement produced by the battle of Lexington—which at once brought up the spirit even of the most hesitating patriots to the fighting pitch, and which was speedily followed by the seizure of the fortresses of Ticonderoga and Crown Point, and by other similar seizures in other colonies—Adams set out for Philadelphia to attend the continental congress of 1775, of which he had been appointed a member. This second congress, though made up for the most part of the same men, was a wholly different body from its predecessor. That was a mere consulting convention. The new congress speedily assumed, or rather had thrust upon it by the unanimous consent of the patriots, the exercise of a comprehensive authority, in which supreme executive, legislative, and in some cases judicial functions were united. In this busy scene the active and untiring Adams, one of whose distinguishing characteristics was his capacity and fondness for business, found ample employment, while his bold and pugnacious spirit was not a little excited by the hazards and dignity of the great game in which he had come to hold so deep a stake. Adams had made up his mind that any reconciliation with the mother country was hopeless. The majority of congress were not yet of that opinion. Under the lead of John Dickinson, though against the strenuous resistance of Adams and others, that body voted still another and final petition to the king. Adams succeeded, however, in joining with this vote one to put the colonies into a state of defence, though with protestations that the war on their part was defensive only, and without any intention to throw off their allegiance. Not long after, congress was brought up to the point of assuming the responsibility and control of the military operations which New England had commenced by laying siege to Boston, in which town Gage and his troops were shut up, and before which lay encamped an impromptu New England army of 15,000 men, drawn together immediately after the battle of Lexington. Urged by the New England delegates, congress agreed to assume the expense and control of this army. Adams, in his autobiography, claims the honor of having first proposed Washington for the chief command, a concession intended to secure the good will and firm coöperation of Virginia and the southern colonies. Those colonies urged Gen. Lee for the second place in the army, but Adams insisted on giving that to Artemas Ward, then commanding the New England army before Boston. He supported Lee, however, for the third place. Having assumed the direction of this army, provided for its reorganization, and issued bills of credit to support it, congress took a short recess. Adams, returning home, sat in the interval as a member of the Massachusetts council, which, treating the office of governor as vacant, had, under a clause of the provincial charter intended to meet such cases, assumed the executive authority. On returning to Philadelphia in September, Adams found himself in hot water. Two confidential letters of his, written during the previous session, had been intercepted by the British in crossing Hudson river, and had been published in the Boston papers. Not only did these letters evince a zeal for decisive measures which made the writer an object of suspicion to the more conservative of his fellow members of congress, but his reference in one of them to "the whims, the caprice, the vanity, the superstition, the irritability" of some of his colleagues, and in particular to John Dickinson as "a certain great fortune but piddling genius," made him personal enemies who never forgave him. But though for the moment an object of distrust to some of his colleagues, this did not save him from hard work. "I am engaged in constant business," so he wrote about this time, "from seven to ten in the morning in committee, from ten to four in congress, and from six to ten again in committee. Our assembly is scarcely numerous enough for the business; everybody is engaged all day in congress, and all the morning and evening in committees." The committee which chiefly engaged Mr. Adams's attention at this time was one on fitting out cruisers, and on naval affairs generally. This committee laid the first foundation of an American navy, a body of rules and regulations for which—the basis of our existing naval code—was drawn up by Adams. Governor Wentworth having fled from New Hampshire, the people of that province applied to congress for advice as to the method of administration they should adopt. Adams seized the opportunity to urge the necessity of advising all the provinces to proceed at once to institute governments of their own. The news which soon arrived of the supercilious treatment of the petition of congress to the king added strength to his views, and the matter being referred to a committee on which Adams was placed, a report in partial conformity to his ideas was made and adopted. Having been offered the post of chief justice of Massachusetts, Adams toward the end of the year returned home to consult on that and other important subjects. He took his seat in the council, of which he had been chosen a member immediately on his arrival, and was consulted by Washington both as to sending Gen. Lee to New York, and as to the expedition against Canada. It was finally arranged that while Adams should accept the appointment of chief justice, he should still remain a delegate in congress, and till more quiet times should be excused from acting as judge. Under this arrangement he returned to Philadelphia early in 1776. He never took his seat as chief justice, but resigned that office the next year.—Advice similar to that to New Hampshire, on the subject of assuming government, as it was called, had been shortly after given upon similar applications to congress from South Carolina and Virginia. Adams was much consulted by members of the southern delegation (as being better versed than themselves in the subject of republicanism, both by study and experience, coming as he did from the most thoroughly republican section of the country) concerning the form of government which they should adopt. Of several letters which he wrote on this subject, one more elaborate than the others was printed, under the title of "Thoughts on Government applicable to the Present State of the American Colonies." This pamphlet, largely circulated in Virginia, as a preliminary to the adoption of a form of government by that State, was to a certain extent a rejoinder to that part of Paine's famous pamphlet of "Common Sense" which advocated government by a single assembly. It was also intended to controvert the aristocratic views, somewhat prevalent in Virginia, of those who advocated a governor and senate for life. Adams's system of policy embraced the adoption of self-government by each of the colonies, a confederation, and treaties with foreign powers. This system he continued to urge with zeal and increasing success, till finally, on May 13, he carried a resolution through congress, by which so much of his plan was indorsed by that body as related to the assumption of self-government by the several colonies. The first step thus taken, the others soon followed. A resolution that the United States "are and ought to be free and independent," introduced by R. H. Lee, under instructions from the Virginia convention, was very warmly supported by Adams, and carried, seven states to six. Three committees, one on a declaration of independence, another on confederation, and a third on foreign relations, were shortly after appointed. Of the first and third of these committees Adams was a member. The declaration of independence was drawn up by Jefferson, but on Adams devolved the task of battling it through congress in a three days' debate, during which it underwent some curtailment. The plan of a treaty reported by the third committee, and adopted by congress, was drawn up by Adams. His views did not extend beyond merely commercial treaties. He was opposed to seeking any political connection with France, or any military or even naval assistance from her or any foreign power. On June 12 congress had established a board of war and ordnance, to consist of five members, with a secretary, clerk, &c.—in fact, a war department. As originally constituted, the members of this board were taken from congress, and John Adams was made its chairman or president. This position, which was one of great labor and responsibility, as the chief burden of the duties fell upon him, he continued to hold for the next eighteen months, with the exception of a necessary absence at the close of the year 1776, to recruit his health. The business of preparing articles of war for the government of the army was deputed to a committee composed of Adams and Jefferson; but Jefferson, according to Adams's account, threw upon him the whole burden, not only of drawing up the articles—which he borrowed mostly from those of Great Britain—but of arguing them through congress, which was no small task. Adams strongly opposed Lord Howe's invitation to a conference, sent to congress after the battle of Long Island, through his prisoner, Gen. Sullivan. He was, however, appointed one of the committee for that purpose, along with Franklin and Rutledge, and his autobiography contains some curious anecdotes of the visit. Besides his presidency of the board of war, Adams was also chairman of the committee upon which devolved the decision of appeals in admiralty cases from the state courts.—Having thus occupied for nearly two years a position which gained him the reputation among at least a portion of his colleagues of having "the clearest head and firmest heart of any man in congress," he was appointed near the end of the year 1777 a commissioner to France to supersede Deane, whom congress had determined to recall. He embarked at Boston, in the frigate Boston, on Feb. 12, 1778, reached Bordeaux after a stormy passage, and arrived on April 8 at Paris. Already before his arrival the alliance with France had been completed, and his stay was not long. He found that a very great antagonism of views and feeling had arisen between the three commissioners, Franklin, Deane, and Arthur Lee, of whom the embassy to France had been originally composed; and as the recall of Deane had not reconciled the other two, Adams advised, as the only means of giving unity and energy to the mission, that it should be intrusted to a single person. This suggestion was adopted, and in consequence of it, Franklin having been appointed sole ambassador in France, Adams returned home in the same French frigate which took out the new French minister, the chevalier de la Luzerne. He arrived at Boston just as a convention was about to meet to form a state constitution for Massachusetts; and being chosen a delegate from Braintree, he took a leading part in its formation. Before this convention had finished its business, he was appointed by congress minister to treat with Great Britain for peace and commerce, under which appointment he sailed again for France in 1779, in the same French frigate in which he had returned. Very contrary to his own inclinations, Mr. Adams was prevented by Vergennes, the French minister of foreign affairs, from making to Great Britain any communication of his powers. In fact, Vergennes and Adams already were and continued to be to each other objects of serious distrust, in both cases quite unfounded. Vergennes feared lest advances toward treating with England might lead to some sort of reconciliation with her short of the independence of the colonies, which was contrary to his ideas of the interest of France. The communications made to him by Gérard, the first French minister in America, and Adams's connection with the Lees, whom Vergennes suspected, though unjustly, of a secret communication through Arthur Lee with the British ministry, led him to regard Mr. Adams as the representative of a party in congress desirous of such a reconciliation; nor did he rest till he had obtained from congress, some two years after, the recall of Mr. Adams's powers to negotiate a treaty of commerce, and the conjunction with him of several colleagues to treat for peace, of whom Franklin, who enjoyed his entire confidence, was one. Adams, on the other hand, not entirely free from hereditary English prejudices against the French, vehemently suspected Vergennes of a design to sacrifice the interests of the United States, especially the fisheries and the western lands, to the advancement of the Spanish house of Bourbon. While lingering at Paris, with nothing to do except to nurse these suspicions, Adams busied himself in furnishing communications on American affairs to a semi-official gazette, the *Mercure de France*, conducted by M. Genet, chief secretary in the foreign bureau, and father of the French minister in America, who subsequently rendered that name so notorious. Finding his position at Paris not very comfortable, he proceeded to Holland in July, 1780, his object being to form an opinion as to the probability of borrowing money there. Just about the same time he was appointed by congress to negotiate a Dutch loan, Laurens, who had been selected for that purpose, being not yet ready to leave home. By way of enlightening the Dutch as to American affairs, Adams published in the "Gazette" of Leyden, and in a magazine called *Politique hollandaise*, a number of papers and extracts, including several which, through a friend, he procured to be first published in a London journal, to give to them an English character. To these he added a direct publication of his own, afterward many times reprinted, and to be found in the 7th volume of his collected works, under the title of "Twenty-six Letters upon Interesting Subjects, respecting the Revolution in America." He had commenced negotiations for a loan, when his labors in that direction were interrupted by the sudden breach between England and Holland, consequent upon the capture of Laurens, and the discovery of the secret negotiation carried on between him and Van Berkel of Amsterdam, which, though it had been entered upon without authority from the Dutch states, the British made the pretence for a speedy declaration of war. Adams was soon after appointed minister to Holland in place of the captured Laurens, and at the same time was commissioned to sign the articles of armed neutrality, which had just made their appearance on the political scene. Adams presented memorials to the Dutch government, setting forth his powers in both respects; but before he could procure any recognition, he was recalled in July, 1781, to Paris, by a notice that he was needed there in his character of minister, to treat of peace. Adams's suspicions of Vergennes had, meanwhile, been not a little increased by the neglect of France to second his applications to Holland. With Vergennes the great object was peace. The finances of France were sadly embarrassed. Vergennes wished no further complications to the war, and, provided the English colonies should be definitely separated from the mother country, which he considered indispensable to the interest of France, he was not disposed to insist on anything else. It was for this reason that he had urged upon congress, through the French minister at Philadelphia, and just about this time had succeeded in obtaining from congress—though the information had not yet reached Paris—not only the withdrawal of Adams's commission to treat of commerce, and the enlargement to five of the number of commissioners to treat of peace, but an absolute discretion intrusted to the negotiators as to everything except independence and the additional direction that in the last resort they were to be governed by Vergennes's advice. The cause of sending for Adams, who still occupied, so far as was known at Paris, the position of sole negotiator for peace, was the offer of a mediation on the part of Russia and the German empire. But this offer led to nothing. Great Britain haughtily rejected it on the ground that she would not allow France to stand between her and her colonies.—Returning to Holland, Mr. Adams, though still unsupported by Vergennes, pushed with great energy his reception as ambassador by the states general, which at length, April 19, 1782, he succeeded in accomplishing. Following up this success with his customary perseverance, he succeeded before the end of the year in negotiating a Dutch loan of two millions of dollars, the first of a series which proved a chief financial resource of the continental congress in its later days. He also succeeded in negotiating a treaty of amity and commerce. His success in these negotiations, considering the obstacles he had to encounter, and the want of support from Vergennes, he was accustomed to regard as the greatest triumph of his life.—Before this business was completed, Mr. Adams received urgent calls to come to Paris, where Jay and Franklin, two of the new commissioners, were already treating for peace, and where he arrived Oct. 26. Though Mr. Jay had been put into the diplomatic service by the procurement of the party in congress in the French interest, his diplomatic experience in Spain had led him to entertain doubts also as to the sincere good will of Vergennes. A confidential despatch from M. Marbois, French secretary of legation in America, intercepted by the British, and which Oswald, the British negotiator at Paris, communicated to Franklin and Jay, with a view to make bad feeling between them and the French minister, had, along with other circumstances, induced Franklin and Jay to disregard their instructions, and to proceed to treat with Oswald without communicating that fact to Vergennes, or taking his advice as to the terms of the treaty—a procedure in which Adams, after his arrival, fully concurred. It was chiefly through his energy and persistence that the participation of America in the fisheries was secured by the treaty, not as a favor or privilege, but as a right—a matter of much greater importance then than now, the fisheries being at that time a more important branch than now of American maritime industry.—Immediately upon the signature of the preliminary articles of peace, Adams asked leave to resign all his commissions and to return home, to which congress responded by appointing him a commissioner jointly with Franklin and Jay to negotiate a treaty of commerce with Great Britain. His first visit to England was, however, in a private character, to recruit his health, after a violent fever with which he had been attacked, shortly after signing the treaty of peace. He spent some time first at London, and afterward at Bath; but while still an invalid he was recalled, in the dead of winter, to Holland, which he reached only after a very stormy and uncomfortable passage, there to negotiate a new loan, as the means of meeting government bills drawn in America, which were in danger of protest from want of funds—a business in which he succeeded, though not without paying a pretty high premium. Adams was included, along with Franklin and Jefferson, the latter sent out to take the place of Jay, in a new commission to form treaties with foreign powers; and his being joined by Mrs. Adams and their only daughter and youngest son, his other two sons being already with him, reconciled him to the idea of remaining abroad. With his family about him he fixed his residence at Auteuil, near Paris, where he had an interval of comparative leisure and enjoyment. The chief business of the new commission was the negotiation of a treaty with Prussia, advances toward which had first been been made to Adams while at the Hague, negotiating the Dutch loan. But before that treaty was ready for signature, Adams was appointed by congress minister to the court of St. James's, where he arrived in May, 1785. The English government, of which the feelings were well represented by those of the king, had neither the magnanimity nor the policy to treat the new American states with generosity, nor hardly with justice. Adams was received with civility, but no commercial arrangements could be made, and his chief employment was that of complaining of the non-execution of the treaty of peace, especially in relation to the non-surrender of the western posts, and in attempting to meet similar complaints urged not without strong grounds on the part of the British, more particularly as to the obstacles put in the way of the collection of British debts, which were made an excuse for the detention of the western posts. Made sensible in many ways of the aggravation of British feelings toward the new republic, whose condition immediately after the peace was somewhat embarrassing, and not so flattering as it might have been to the advocates and promoters of the revolution, the situation of Adams was rather mortifying than agreeable. Meanwhile he was obliged to pay a new visit to Holland to negotiate a new loan as a means of paying the interest on the Dutch debt. He was also engaged in a correspondence with his fellow commissioner, Mr. Jefferson, then at Paris, on the subject of a treaty with the Barbary powers and the return of the Americans held captive by them. But his most engrossing occupation at this time was the preparation of his "Defence of the American Constitutions," of which the object was the justification of balanced governments and a division of powers, especially the legislative, against the idea of a single assembly and a pure democracy, which had begun to find many ardent advocates, especially on the continent. The greater part, however, of this book—the most voluminous of his publications—consists of summaries of the histories of the Italian republics, by no means essential to the argument, and rather an excrescence. Though it afterward subjected the author to charges of monarchical and anti-republican tendencies, this book was not without its influence on the adoption of the federal constitution, during the discussion upon which the first volume of it appeared.—Great Britain not having reciprocated the compliment by appointing a minister to the United States, and there being no prospect of his being able to accomplish any of the objects of his mission, Adams had solicited a recall, which was sent out to him in February, 1788, accompanied by a resolution of congress conveying the thanks of that body for "the patriotism, perseverance, integrity, and diligence" which he had displayed in his ten years' service abroad. Immediately on his arrival home, Mr. Adams was reappointed a delegate from Massachusetts to the continental congress; but he never resumed his seat in that body, which was now just about to expire.—When the new government came to be organized under the newly adopted federal constitution, as all were agreed to make Washington president, attention was turned to New England for a vice president. This office was then regarded as of much higher consequence than now. In fact, as the constitution originally stood, the candidates for the presidency and vice presidency were voted for without any distinct specification, the second office falling to the person who had the second highest vote. Out of 69 electors, John Adams had the votes of 34; and this being the second highest number, he was declared vice president. The other 35 votes were scattered upon no less than 10 candidates. By virtue of his new office he became president of the senate, a position not very agreeable to his active and leading temperament, better fitted for debate, but one in which the close division in the senate, resulting often in a tie between the supporters and the opponents of the new system, gave him many times a controlling voice. In the first congress he gave no fewer than 20 casting votes, always upon important organic laws, and always in support of Washington's policy.—Down to this period Adams had sympathized in political feeling and sentiment with Jefferson, with whom he had served both in the continental congress and abroad. On the question of the French revolution, which now burst upon the world, a difference of opinion arose between them. From the very beginning Adams, then almost alone, had augured no good from that movement. As the revolution went on and began to break out in excesses, others began to be of this opinion. Adams then gave public expression to some of his ideas on that subject in a series of "Discourses on Davila," furnished to a Philadelphia newspaper and afterward collected into a volume. Taking the history of nations, particularly Davila's account of the French civil wars, and the general aspects of human society as his text, Adams pointed out as the great springs of human activity, at least in all that related to politics, the love of superiority, the desire of distinction, admiration, and applause; nor in his opinion could any government be permanent or secure which did not provide as well for the reasonable gratification as for the due restraint of this powerful passion. Repudiating that democracy pure and simple then coming into vogue, and of which Jefferson was the advocate, he insisted that a certain mixture of aristocracy and monarchy was necessary to that balance of interests and sentiments without which, as he maintained, free governments could not exist. This work, which reproduced more at length and in a more obnoxious form the fundamental ideas of his "Defence of the American Constitutions," made Adams a great bugbear to the ultra-democratic supporters of the principles and policy of the French revolutionists; and at the second presidential election in 1792, they set up as a candidate against him George Clinton of New York. But Mr. Adams was reëlected by a decided vote. The wise policy of neutrality adopted by Washington received the hearty concurrence of Adams. While Jefferson left the cabinet to become in nominal retirement the leader of the opposition, Adams continued as vice president to give Washington's administration the benefit of his casting vote. It was only by this means that a neutrality act was carried through the senate, and that the progress was stopped of certain resolutions which had previously passed in the house of representatives, embodying restrictive measures against Great Britain, intended or at least calculated to counterwork the mission to England on which Mr. Jay had already been sent.—Washington being firmly resolved to retire at the close of his second presidential term, the question of the successorship now presented itself. Jefferson was the leader of the opposition, who called themselves republicans, the name democrat being yet in bad odor, and, though often imposed as a term of reproach, not yet voluntarily assumed except by a few more ultra partisans. Hamilton was the leader of the federal party, as the supporters of Washington's administration had christened themselves. But though Hamilton's zeal and energy had made him, even while like Jefferson in nominal retirement, the leader of the federalists, he could hardly be said to hold the same place with them that Jefferson did with the republicans, whose presidential candidate he was, a position among the federalists which belonged less to Hamilton than to Adams or Jay, whose greater age and longer public service placed them more conspicuously in the public eye. Hamilton, though he had always spoken of Adams as a man of unconquerable intrepidity and incorruptible integrity, and as such had already twice supported him for vice president, would yet have much preferred Jay. The position of Adams was, however, such as to render his election more probable than that of Jay, and to determine his selection as the candidate of the federalists. Jay, by his negotiation of the famous treaty which bore his name, had for the moment drawn down upon himself a strong feeling of hostility on the part of its numerous and bitter opponents. Adams stood, moreover, as vice president in the line of promotion, and was more sure of the New England vote, which was absolutely indispensable to the success of either. One of the candidates being taken from the North, it seemed politic to select the other from the South, and the federalist leaders pitched for that purpose upon Thomas Pinckney of South Carolina. Indeed, there were some, and Hamilton was among the number, who secretly wished that Pinckney might receive the larger vote, and so be chosen president over Adams's head—a result, from the likelihood of Pinckney's obtaining more votes than Adams at the South (as he really did), almost sure to happen could the northern federal electors be persuaded to vote equally for Adams and for Pinckney, which Hamilton labored to effect. The fear, however, that Pinckney might be chosen over Adams, led to the withholding from Pinckney of eighteen New England votes, so that the result was not only to make Jefferson vice president, as having more votes than Pinckney, but also to excite prejudices and suspicions in the mind of Adams against Hamilton, which, being reciprocated by him, led speedily to the disruption and final overthrow of the federal party. It had almost happened, such was the equal division of parties, that Jefferson had this time been chosen president, the election of Adams, who had 71 votes to Jefferson's 68, being only secured by two stray votes cast for him, one in Virginia and the other in North Carolina, tributes of revolutionary reminiscences and personal esteem. Chosen by this slender majority, Mr. Adams succeeded to office (March 4, 1797) at a very dangerous and exciting crisis of affairs. The progress of the French revolution had superinduced upon previous party divisions a new and very vehement one. Jefferson's supporters, who sympathized very warmly with the French republic, gave their moral if not their positive support to the claim set up by its rulers, but which Washington had refused to admit, that under the provisions of the French treaty of alliance the United States were bound to support France against Great Britain, at least in the defence of her West India possessions. The other party, the supporters of Adams, upheld the policy of neutrality adopted by Washington. At the same time that Washington had sent Jay to England to arrange, if possible, the pending difficulties with that country, wishing also to keep on good terms with the French republic, he had recalled Gouverneur Morris, who as minister to France had made himself obnoxious to the now predominant party there, and had appointed James Monroe in his place. Monroe, instead of conforming to his instructions and attempting to reconcile the French to Jay's mission, had given them assurances on the subject quite in contradiction with the treaty as made, both the formation and ratification of which Monroe had done his best to defeat. He had in consequence been recalled by Washington shortly before the close of his term of office, and C. C. Pinckney, a brother of Thomas Pinckney, had been appointed in his place. The French authorities, offended at this change and at the ratification of Jay's treaty in spite of their remonstrances, while they dismissed Monroe with great ovations, refused to receive the new ambassador sent in his place, at the same time issuing decrees and orders highly injurious to American commerce. Almost the first act of Mr. Adams as president was to call an extra session of congress to consider what should be done. Not only was a war with France greatly to be dreaded and deprecated on account of her great military and naval power, but still more so on account of the very formidable party which, among the ultra republicans, she could muster within the states themselves. Under these circumstances, the measure resolved upon by Adams and his cabinet was the appointment of a new and more solemn commission to France, composed of Pinckney and two colleagues, for which purpose the president selected John Marshall of Virginia and Elbridge Gerry of Massachusetts. But instead of receiving and openly treating with those commissioners, Talleyrand, lately an exile in America, but now secretary of foreign affairs to the French directory, entered into an intrigue with them through several unaccredited and unofficial agents, of which the object was to induce them to promise a round bribe to the directors and a large sum of money to the exhausted French treasury, by way of purchasing forbearance. As Pinckney and Marshall appeared less pliable than Gerry, Talleyrand finally obliged them to leave, after which he attempted, though still without success, to extract money or promises of it from Gerry alone. The publication of the despatches in which these discreditable intrigues were disclosed (an event on which Talleyrand had not calculated) produced a great excitement both in Europe and America. Talleyrand attempted to escape by disavowing his agents, and pretending that the American ministers had been imposed upon by adventurers. Gerry left France, and the violation of American commercial and maritime rights was pushed to new extremes. In America the effect of all this was greatly to strengthen for the moment the federal party. The grand jury of the federal circuit court for Pennsylvania set the example of an address to the president, applauding his manly stand for the rights and dignity of the nation. Philadelphia, which, under the lead of Mifflin, McKean, and others, had gone over to the opposition, was suddenly converted once more, as during Washington's first term, to the support of the federal government. That city was then the headquarters of the American newspaper press. All the hitherto neutral papers published there, as well as several others which had more or less decidedly leaned to the opposition, came out now in behalf of Adams. Besides an address from five thousand citizens, the young men got up a separate address of their own. This example was speedily imitated all over the country, and the spirited replies of the president, who was now in his element, served in their turn to blow up and sustain the blaze of patriotic indignation. These addresses, circulated everywhere in the newspapers, were collected at the time in a volume, and they reappear in Adams's works, of which they form a characteristic portion. A navy was set on foot, the old continental navy having become extinct, and an army was voted and partly levied, of which Washington accepted the chief command. Merchant ships were authorized to protect themselves. The treaty with France was declared to be at an end, and a quasi war with France ensued. It was not, however, the policy of France to drive the United States into the arms of Great Britain. Even before Gerry's departure Talleyrand had made some advances toward reconciliation, which were afterward renewed by communications opened with Vans Murray, the American minister to Holland. The effect of the French outrages and of the progress of the French revolution had been to create, in a part at least of the federal party, the desire for an absolute breach with France—a desire felt by Hamilton, and by three at least out of the four cabinet officers whom Adams had found and had kept in office. In his message to congress announcing the expulsion of Pinckney and Marshall, Adams had declared "that he would never send another minister to France without assurances that he would be received." This was on the 21st of July, 1798. When, therefore, on the 18th of February following, without consulting his cabinet or giving them any intimation of his intentions, he sent into the senate the nomination of Vans Murray as minister to France, this act took the country by surprise, and hastened the downfall of the federal party. Some previous acts of Adams, such as the appointment of Gerry, which his cabinet officers had striven to prevent, and his disinclination to make Hamilton second in command of the army till forced into it by Washington, had strengthened the distrust entertained of Adams by Hamilton and many of his friends; and Adams was now accused of seeking, in his attempt to reopen diplomatic intercourse with France, to reconcile his political opponents of the republican party, and to secure by unworthy and impolitic concessions his own reëlection as president. The opposition to Murray's nomination so far prevailed that Murray received two colleagues, Ellsworth of Connecticut and Davie of North Carolina; but the president would not authorize the departure of Ellsworth and Davie till he had received explicit assurances from Talleyrand that they would be duly received as ministers. On arriving in France they found the directory superseded and Napoleon Bonaparte first consul, with whom they managed to arrange the matters in dispute. But, however beneficial to the country, this mission proved very disastrous to Adams personally, and to the political party to which he belonged. He justified its appointment on the ground of assurances conveyed to him through a variety of channels that France desired peace, and he excused himself for not having consulted his cabinet by the fact that he knew what their opinion was without asking them—decidedly hostile, that is, to any such attempt as he had determined to make. The masses of the federalists, fully confident of Adams's patriotism, were well enough disposed to acquiesce in his judgment; but many of the leaders were implacable. The quarrel was further aggravated by Adams's dismissal at this time of his cabinet officers and the construction of a new cabinet. The pardon of Fries, convicted of treason for armed resistance in Pennsylvania to the levy of certain direct taxes, was also regarded by many at the time as a piece of misplaced lenity on the part of Adams, dictated, it was said, by a mean desire of popularity in a case in which severe example was needed. But Adams will hardly suffer with posterity from his unwillingness to be the first president to sign a death warrant for treason, especially as there was room for grave doubts whether the doings of this person amounted to treason as defined by the constitution of the United States.—In this divided condition of the federal party the presidential election came on. Adams was still too popular with the mass of the party to encourage any attempt to drop him altogether, and the malcontents were reduced to the old expedient of attempting by secret understanding and arrangement to reduce his vote in the electoral college below that of C. C. Pinckney, the other of the two candidates voted for by the federalists. The republicans, on the other hand, under the prospect of an arrangement with France, rapidly recovered from the blow inflicted upon them by the violence and mercenary rapacity lately charged upon their French friends, but which they now insisted was a charge without foundation. Taking advantage of the dissatisfaction at the heavy taxes necessarily imposed to meet the expenses of warlike preparations, and especially of the unpopularity of the alien law and the sedition law—two acts of congress to which the prospect of war had led—they pushed the canvass with great energy; while in Thomas Jefferson and Aaron Burr they had two leaders unsurpassed for skill in party tactics, and in Burr, at least, one little scrupulous as to the means which he employed. Not only was the whole blame of the alien and sedition acts, to which he had merely assented without ever having recommended them, laid on Adams's shoulders, but he was the object of most vehement and bitter attacks for having surrendered up, under one of the provisions of Jay's treaty, one Thomas Nash, an English sailor, charged with mutiny and murder. Having been recognized and arrested in Charleston, S. C., Nash had endeavored to save himself by assuming the name and character of Jonathan Robbins, an American citizen, in the light of which assumed character the greater part of Adams's political opponents insisted upon exclusively regarding him, and Adams himself as having basely yielded up an American citizen, who, it was argued, even if guilty of mutiny as charged, had been justified in it by the fact of having been, as it was alleged, previously pressed into the British naval service. Nor was it against his public acts alone, nor even to his political opponents, that these assaults upon Mr. Adams were confined. With strong feeling and busy imagination, loving both to talk and write, Adams had been betrayed into many confidences and into free expression of feelings, opinions, and even conjectures and suspicions—a weakness very unsuited to the character of a politician, and which he had frequent occasion to rue. During Washington's first term of office he had thus been led into a confidential correspondence with Tench Coxe, who held at that time the place of assistant secretary of the treasury, and had afterward been appointed supervisor of the internal revenue, but who since Adams's accession had been dismissed from this place on the charge of being a spy upon the treasury department in the service of the "Aurora," the principal newspaper organ of the opposition, with which party Coxe sympathized, and since his recent dismissal from office had acted. In this state of mind Coxe betrayed a private confidential letter of Adams, which, after having been handed about in manuscript for some time, to the great damage of Adams with his own party, was finally printed in the "Aurora," of which Coxe had become one of the principal contributors. The purport of this letter, written as long ago as May, 1792, was to give countenance to the favorite charge of the opposition that Washington's cabinet, and of course Adams's, which followed the same policy, was under British influence, and that Thomas Pinckney and his brother C. C. Pinckney, candidates with Adams on the federal presidential ticket, were especially obnoxious to this suspicion. The publication of this letter was followed up by a still more deadly blow in the shape of a pamphlet written and printed and signed by Hamilton, and probably intended by him for private distribution among the federal leaders, but which was made public by Aaron Burr, who had succeeded in possessing himself of some of the proof sheets. This pamphlet had its origin in the same charge against Hamilton of being under British influence, thrown out by Adams in private conversation, and as to which, when written to by Hamilton, he had refused to give any explanation, though when a similar request was made by C. C. Pinckney in consequence of the publication of the letter to Coxe, Adams fully exonerated both him and his brother in a published letter from any suspicion which his letter to Coxe might seem calculated to convey. Hamilton declared in the conclusion of his pamphlet, that as things then stood he did not recommend the withholding from Adams of a single vote. Yet it was the leading object of his pamphlet to show, without denying Adams's patriotism and integrity, or even his talents, that he had great and intrinsic defects of character which disqualified him for the place of chief magistrate, and the effect which he desired it to have must have been to give C. C. Pinckney the presidency, by causing a certain number of votes to be withheld from Adams. The result, however, of the election was to throw out both the federal candidates. Adams received 65 votes and Pinckney 64, while Jefferson and Burr had 73 each. In the ensuing struggle between Jefferson and Burr Adams took no part.—Immediately on the expiration of his term of office (1801) he left Washington, to which shortly before the seat of government had been removed, without even stopping to be present at the inauguration of Jefferson, against whom he felt a sense of personal wrong, probably thinking he had been deluded by false professions as to Jefferson's views on the presidential chair. This state of feeling on the part of Adams led to a strict non-intercourse for the next 13 years, though both were much given to letter-writing, and had previously, at least till within a short time before, been on terms of friendly correspondence. The only acknowledgment for his 25 years' services to the nation which Mr. Adams carried with hin in this unwelcome and mortifying retirement, was the privilege which had been granted to Washington on his withdrawal from the presidency, and after his death to his widow, and bestowed likewise upon all subsequent ex-presidents and their widows, of receiving his letters free of postage for the remainder of his life. Fortunately for Adams, his thrifty habits and love of independence, sustained during his absence from home by the economical and managing talents of his wife, had enabled him to add to the savings from his profession before entering public life, savings from his salaries enough to make up a sufficient property to support him for the rest of his life in a style of decent propriety and solid comfort, in conformity to his ideas. Almost all his savings he had invested in the farming lands about him. In his vocabulary, property meant land. With all the rapid wealth then being acquired by trade and navigation, he had no confidence in the permanency of any property but land, views in which he was confirmed by the commercial revulsions of which he lived to be a witness. He was the possessor, partly by inheritance and partly by purchase, of his father's farm, including the house in which he was himself born; but he had transferred his own residence to a larger and handsomer dwelling near by, forfeited by one of the refugee tories of the revolution, and of which he had become the purchaser, where he spent the next quarter of a century. In this comfortable home, acquired by himself, he sought consolation for his troubled spirit in the cultivation of his lands, in books, and in the bosom of his family. Mrs. Adams, to her capacities as a housekeeper, steward, and farm manager, added a brightness and activity of mind and a range of reading, such as fully qualified her to sympathize with her husband in his public as well as his private career. She shared his taste for books, and, as his published letters to her are unsurpassed by any American letters ever yet printed, so hers to him as well as to others, from which a selection has also been published, show her, though with less of nature and more of formality than his letters exhibit, yet worthy of the admiration and respect as well as of the tenderness with which he always regarded her. To affections strong enough to respond to his, a sympathy equal to his highest aspirations, a proud feeling of superiority and an enjoyment of it equal to his own, she added what is not always found in such company, a flexibility sufficient to yield to his stronger will, without disturbance to her serenity or his, and without the least compromise of her own dignity or her husband's respect and deference for her. While she was not ignorant of the foibles of his character, and knew how to avail herself of them when a good purpose was to be served by it, yet her admiration of his abilities, her reliance upon his judgment, her confidence in his goodness, and her pride in his achievements, made her always ready to yield and to conform. His happiness and honor were always her leading object. This union was blessed with children well calculated to add to its happiness. Mr. Adams indeed had the misfortune to lose by death, just at the moment of his retirement from office, private grief being thus added to political disappointment, his second son, Charles. He had grown to manhood, had been married and had settled in New York with flattering prospects, but had died under painful circumstances, which his father speaks of in a contemporary letter as the deepest affliction of his life, leaving a wife and two infant children dependent on him. Col. Smith, an officer of the revolution, who had been Adams's secretary of legation at London, and who had married his only daughter, did not prove in all respects such a son-in-law as he could have wished. His pecuniary affairs becoming embarrassed, his father-in-law had provided for him by several public appointments, the last of which was that of surveyor of the port of New York, which position he was allowed to hold till 1807, when he was removed from it in consequence of his implication in Miranda's expedition. Nor did Thomas Boylston Adams, the third son, though a person of accomplishments and talents, fully answer the hopes of his parents. But all these disappointments were more than made good by the oldest son, John Quincy Adams, who subsequently to his recall from the diplomatic service abroad, into which Washington had introduced him, and in which his father (urged to it by a letter from Washington) had promoted him, was chosen one of the senators in congress from Massachusetts.—All consolations, domestic or otherwise, at Mr. Adams's command, were fully needed. Never did a statesman sink more suddenly, at a time too when his powers of action and inclination for it seemed wholly unimpaired, from a leading position to more absolute political insignificance. His grandson tells us that while the letters addressed to him in the year prior to March 1, 1801, may be counted by thousands, those of the next year scarcely number a hundred, while he wrote even fewer than he received. Nor was mere neglect the worst of it. He sank, loaded with the jibes, the sneers, the execrations even of both political parties into which the nation was divided. It is easy to see now that hardly any degree of union or skill on the part of the federalists, a minority from the beginning and only sustained from the first by the name of Washington and the talent and activity of the inferior leaders, could have prevented the ultimate triumph of the other party. But, as is usual with contemporaries, the disposition then was to explain everything by the skill or luck of individual movements, and a large portion of the most active leaders of the federal party were inclined to hold Adams personally answerable both for the breach in their ranks and for their subsequent overthrow. At the same time, the other party, identifying him with all the measures most obnoxious to them, especially the alien and sedition laws, long continued to use his name as a sort of synonyme for aristocracy, longing after monarchy, bigotry, tyranny, and oppression in general. Especially were they enraged at the passage by the last congress, just before the close of his and their term of office, of a new judiciary act, or rather at Adams's presuming to fill up with federalists the twenty-three new judicial offices, besides attorneys, marshals, and clerks, created by this act. These nominations, stigmatized as "midnight appointments," were assailed, as well as he who made them, by every term of party reproach; nor did the now triumphant republicans rest until, unable to reach these appointees in any other way, they had stripped them of their offices by repealing the act. Though Adams was far more of a speculative philosopher than any of his contemporaries in the field of American politics, except Jefferson, he was by no means philosopher enough to submit with patience to the obloquy with which he was now visited. In the agony of his heart he sat down to defend himself with his pen, at least before the tribunal of posterity. He had been in the habit of keeping, during intervals of his life, a diary or journal, large and very valuable extracts from which appear in the 2d and 3d volumes of his collected works. He now set himself to writing an "Autobiography" and a reply to Hamilton's pamphlet. But though he wrote with great facility and force, neither his eyes, which were weak, his hand, which trembled so as to make the mechanical labor of writing disagreeable, nor yet his habits or his temperament, were favorable to the labor of correction, condensation, and arrangement; and he presently abandoned both those works, though some selections from the "Autobiography" have been published by his grandson by way of filling gaps in his diary. Eight years later, when time had somewhat healed over these wounds, they broke out with new malignancy by reason of renewed attacks upon him by the federalists on account of his son John Quincy Adams having abandoned the federal party, and the disposition evinced by the father to sustain the policy of the administration, rather than that of the federalists, in the disputes which finally terminated in war with Great Britain. Hitherto the Jeffersonian or democratic party had possessed in Boston as its sole newspaper organ "The Chronicle," a very violent paper, of which the staple in times past had been abuse of John Adams as an aristocrat and a monarchist, and the author of the alien and sedition laws. To represent and express the sentiments of a new cohort, which with the years 1806 and 1807 came in Massachusetts to the support of Jefferson, under the leadership of John Q. Adams, a new paper was established called the "Boston Patriot," to which both John Q. Adams and his father became contributors. In the earliest numbers of this paper, John Adams printed (and it may be found in the 9th volume of his collected works) "The inadmissible Principles of the King of England's Proclamation of Oct. 16, 1807, considered," being an examination and refutation of the English doctrine of impressment as applied to British subjects. Very soon, however, he dropped these topics of the day, and reverted to the past. The old charge having been anew brought up against him by some of the federalist papers, of personal motives in setting on foot the mission to France in 1799, he took up that subject in a series of letters to the "Patriot"—also printed in his collected works, vol. ix.—into which he incorporated much of the material collected for his answer to Hamilton. These letters are a valuable contribution to the history of that interesting period, and can hardly fail to be regarded as a complete vindication of Adams's policy and conduct on that occasion—at least if we allow that the immediate welfare of the nation was to be consulted, rather than any supposed prospective interest of any political party. From this beginning Mr. Adams went on to a history especially of his diplomatic career, into which he introduced many valuable documents in his possession. These publications, interrupted and again commenced from time to time, extended over a space of three years. A portion, embracing perhaps two thirds of the whole, was collected and published in pamphlets, which, bound together, made an octavo volume, entitled "Correspondence of the late President Adams, originally published in the Boston 'Patriot' in a series of letters." Thus disjointed, and written, as parts of it evince, and as his published correspondence of this period more clearly shows, under great exasperation of feeling, and coming forth, too, at a period when the events of the day engrossed all thoughts, and during which the history of the revolution was less generally known and less a subject of public interest than at any time before or since, these letters failed to attract the public attention or to satisfy Mr. Adams's ideal of an historical vindication of himself. Seeing how, amid the ignorance and carelessness of the times, the true history of the revolution was in danger of total oblivion or of being transformed into a sort of legend, he abandoned his task with expressions to his private correspondents of contempt for history, and of utter despair of ever having justice done to him. But with the establishment of peace in Europe, and the apparent fulfilment, at least for the moment, of all Mr. Adams's prophecies as to the result of the French revolution, the bitter political obloquy of which he had been the mark—an obloquy directed against him from two opposite quarters at once—began sensibly to relax; and as those who had been contemporaries with his active life one after another dropped off, he himself began to fill, while yet alive, the position in general estimation of a hero of the past. After Mr. Jefferson's withdrawal from political life, through the agency of Dr. Rush, who had all along remained the personal friend of both, correspondence by letter was renewed between Adams and Jefferson and kept up for the remainder of their lives. About the same time also Adams opened a correspondence with McKean, his friend and coöperator in revolutionary times, but separated from him in the whirlpool of subsequent politics; and he thus drew out from McKean some valuable historical reminiscences. Mr. Adams indeed gave great attention to the subject of American history. His letters to Mr. Tudor (which led to the publication by that gentleman of the "Life of James Otis") shed great light upon the early history of the revolution in Massachusetts. They contributed not a little to give the first impulse to that study of American history, revolutionary and colonial, which, commencing about that time, has rescued those subjects from the hands of rhetoricians and fabulists, and has produced so many valuable and authentic historical works. In his correspondence, which appears to have gradually increased and extended itself, Mr. Adams loved to recall and to reëxplain his theoretical ideas of government, on some points of which he pushed Jefferson rather hard, and which the result of the French revolution so far as then developed seemed to confirm. Another subject in which he continued to feel a great interest was that of theology. He had begun as an Arminian, and the more he had read and thought and the older he grew, the freer views he took. Though clinging with tenacity to the religious institutions of New England, it would seem from his correspondence that he had finally curtailed his theology to the ten commandments and the sermon on the mount. Of his views on this point he gave evidence in his last public act, to which we now approach. Mrs. Adams had died in 1818, but even that shock, severe as it was, did not unsettle the firm grasp of her husband on life, its enjoyments and its duties. When, in consequence of the erection of the district of Maine into a separate state, a convention was to meet in 1820 to revise the constitution of Massachusetts, in the framing of which Mr. Adams had taken so leading a part, though in his 86th year, he was chosen a delegate by his townsmen. Upon his first appearance, with a form yet erect, though tremulous with age, in this convention, which included almost everybody in the state of distinguished intelligence or reputation, Mr. Adams was received by the members standing, and with every demonstration of affection and regard; and a series of resolutions was forthwith offered and passed, containing an enumeration and warm acknowledgment of some of his principal public services, and calling upon him to preside. But this, while duly acknowledging the compliment, he declined on the score of his age and infirmities. The same cause also prevented his taking any very active part in the proceedings. Yet he labored to produce a modification of the third article of the bill of rights, on the subject of public worship and its support, an article which, when originally drawing the rest of that instrument, he had passed over to other hands. But the time had not yet come for such changes as he wished. The old puritan feeling was still in too great force to acknowledge the equal rights, political and religious, of others than Christians. Yet, however it might be with his colleagues or his fellow citizens, Mr. Adams in this movement expressed his own ideas. One of his latest letters, written in 1825 and addressed to Jefferson, is a remarkable protest against the blasphemy laws, so called, of Massachusetts and the rest of the Union, as being utterly inconsistent with the rights of free inquiry and private judgment.—It is in the letters of Mr. Adams, of which but a small part have yet been published, that his genius as a writer and thinker, and no less distinctly his character as a man, most clearly appear. Down even to the last year of his protracted life, his letters exhibit a wonderful degree of vitality, energy, acuteness, wit, playfulness, and command of language. As a writer of English, little as he ever troubled himself with revision and correction, and we may add as a speculative philosopher, he must be placed first among Americans of all the several generations to which he belonged, except only Franklin; and if Franklin excelled him in humor and geniality, he far surpassed Franklin in compass, wit, and vivacity. Indeed, it is only by the recent partial publication of his letters that his gifts in this respect are beginning to become known. The first collection of his private letters, published in his lifetime and much against his will, though not deficient in the characteristics above pointed out, yet, having been written under feelings of great aggravation and in a spirit of extreme bitterness toward his political opponents, was rather damaging to him. This publication was one of the incidents of his becoming for a third time, in his extreme age, an object of hostility, confined now, however, to a few of the more tenacious of his old federalist opponents, in consequence of the coalition of all parties in New England to support his son, J. Q. Adams, for the presidency. In the interval from 1804 to 1812, Mr. Cunningham, a maternal relative, had drawn him into a confidential correspondence, in which, still smarting under a sense of injury, he had expressed himself with perfect unreserve and entire freedom as to the chief events of his presidential administration and the character and motives of the parties concerned in them. By a gross breach of confidence, of which, like other impulsive and confiding persons, Mr. Adams had been often the victim, those letters were sold by Cunningham's heir in 1824, while the writer and many of the parties referred to were still alive, and were published as a part of the electioneering machinery against J. Q. Adams. They called out a violent retort from Col. Pickering, who had been secretary of state to

Washington and Adams, till dismissed from office by the latter; but though Mr. Jefferson was also severely handled in them, they occasioned no new interruption to the friendly correspondence for some years reëstablished between him and Adams. Those two leading actors in American politics, at first so coöperative and afterward so hostile, again reunited in friendly intercourse, having outlived almost all their fellow actors, continued to descend hand in hand to the grave. Adams lived to see his son president and to receive Jefferson's congratulations upon it. By a remarkable coincidence, they both expired on the 50th anniversary of that declaration of independence in which they had both taken so active a part, Adams, however, being the survivor by a few hours.—Of Adams's personal appearance and domestic character in his old age, his grandson gives the following account: "In figure John Adams was not tall, scarcely exceeding middle height, but of a stout, well knit frame, denoting vigor and long life, yet as he grew old inclining more and more to corpulence. His head was large and round, with a wide forehead and expanded brows. His eye was mild and benignant, perhaps even humorous when he was free from emotion, but when excited it fully expressed the vehemence of the spirit that stirred within. His presence was grave and imposing on serious occasions, but not unbending. He delighted in social conversation, in which he was sometimes tempted to what he called rhodomontade. But he seldom fatigued those who heard him; for he mixed so much of natural vigor of fancy and illustration with the store of his acquired knowledge, as to keep alive their interest for a long time. His affections were warm, though not habitually demonstrated toward his relatives. His anger, when thoroughly aroused, was for a time extremely violent, but when it subsided it left no trace of malevolence behind. Nobody could see him intimately without admiring the simplicity and truth which shone in his actions, and standing in some awe of the power and energy of his will. It was in these moments that he impressed those around him with a sense of his greatness. Even the men employed on his farm were in the habit of citing instances, some of which have been remembered down to the present day. At times his vehemence would become so great as to make him overbearing and unjust. This was most apt to happen in cases of pretension and any kind of wrong-doing. Mr. Adams was very impatient of cant, or of opposition to any of his deeply established convictions. Neither was his indignation at all graduated to the character of the individuals who might happen to excite it. It had little respect of persons, and would hold an illiterate man or a raw boy to as heavy a responsibility for uttering a crude heresy as the strongest thinker or the most profound scholar." The same writer makes the following remarks on his general character: "His nature was too susceptible to emotions of sympathy and kindness, for it tempted him to trust more than was prudent in the professions of some who proved unworthy of his confidence. Ambitious in one sense he certainly was, but it was not the mere aspiration for place or power. It was a desire to excel in the minds of men by the development of high qualities, the love, in short, of an honorable fame, that stirred him to exult in the rewards of popular favor. Yet this passion never tempted him to change a course of action or to suppress a serious conviction, to bend to a prevailing error or to disavow one odious truth." This last assertion involves some controverted points of history; yet this at least must be granted, that it may be made with far more plausibility of Mr. Adams than of the greater portion of political men. The pecuniary independence which previous to his retirement Mr. Adams had secured by a judicious adaptation of his expenditures to his income, more fortunate than Mr. Jefferson, he maintained till the end of his life. Although he had a large family, including grandchildren and great-grandchildren, dependent upon him, he yet died in the possession of a valuable landed estate.—See "Life and Works of John Adams," by Charles Francis Adams (10 vols. 8vo, Boston, 1850–'56), and "Life of John Adams," by J. Q. and C. F. Adams (2 vols. 8vo, 1871).

ADAMS, John, the assumed name of ALEXANDER SMITH, one of the mutineers of the British ship Bounty, born in London in 1764, died on Pitcairn island, March 29, 1829. In 1787 he joined the Bounty as a common sailor, and was one of those who revolted against Lieut. Bligh on April 28, 1789. (See BLIGH, WILLIAM.) On Jan. 23, 1790, after various adventures, Adams landed with the other mutineers and a number of Tahitian men and women on Pitcairn island, where he spent the rest of his life. In 1800 he found himself the sole surviving Englishman, and the only guardian and teacher of a community of women and children. He organized divine service according to the forms of the church of England, and acted also as a schoolmaster. In 1808, when Capt. Mayhew Folger, of the American ship Topaz, landed on the island, Adams gave him an account of the feuds among his companions and the Tahitian men and women, ending in the violent death of all except himself and Young. Capt. Folger, in return, gave him a rapid sketch of the great events of the preceding 20 years, all of which were entirely new to him. The captain's report of this extraordinary meeting with Adams bore testimony to the excellent moral and religious training of the little community, and was accompanied by the chronometer and azimuth compass of the Bounty, presented to him by Adams. It was after the visit of Capt. Folger that he changed his real name of

Alexander Smith to John Adams, to avoid recognition and conviction for mutiny in England. The island was visited only two or three times afterward during Adams's life. In 1825 a man named Buffett was permitted to settle there, and, being well educated, relieved Adams of the business of teaching. Lady Belcher, in her work on the "Mutineers of the Bounty" (London, 1871), says: "By the mercy of God and by the aid of his Bible and prayer book, which he had so earnestly studied, John Adams succeeded in establishing such a community as has been the dream of poets and the aspiration of philosophers." (See PITCAIRN ISLAND.)

ADAMS, John, LL. D., an American teacher and philanthropist, born in Canterbury, Conn., in 1772, died in Jacksonville, Ill., April 24, 1863. He was a son of John Adams, an officer in the revolutionary army from Connecticut, and graduated at Yale college in 1795. Until 1798 he taught the academy in his native town; from 1800 to 1803 he was rector of Plainfield academy; from 1803 to 1810 principal of Bacon academy, Colchester, Conn.; and from 1810 to 1833 principal of Phillips academy, Andover, Mass. He was during this period also one of the founders of several of the national benevolent societies. After being thus engaged in teaching for 36 years, he resigned and removed to Illinois, where he was instrumental in introducing some valuable modifications into the school laws; and when past 70 years of age he organized several hundred Sunday schools in different parts of the state. He published several essays on the training of the young, and left others in manuscript.

ADAMS, John Couch, an English astronomer, born of humble parentage near Bodmin, June 5, 1819. He is a fellow of Pembroke college, Cambridge, England, and shares with Leverrier the honor of having calculated the place of the planet Neptune before it had been recognized by sight. He early showed great powers, and in 1841, while in St. John's college, made his first computation of Neptune's place. In 1844–'6 he renewed his calculations, and communicated the results to Professors Challis and Airy; but he did not publish them, and therefore Leverrier, who soon after attained and published similar results, has reaped the larger share of glory. The calculations of both mathematicians were formed on the motions of the planet Uranus, which was drawn aside from its expected course by the attraction of Neptune. In 1858 Adams was appointed Lowndean professor of astronomy at Cambridge.

ADAMS, John Quincy, sixth president of the United States, eldest son of President John Adams, born in Braintree, July 11, 1767, died in Washington, Feb. 23, 1848. The origin of his name was thus stated by himself: "My great-grandfather, John Quincy, was dying when I was baptized, and his daughter, my grandmother, requested I might receive his name. This fact, recorded by my father, has connected with my name a charm of mingled sensibility and devotion. It was filial tenderness that gave the name—it was the name of one passing from earth to immortality. These have been through life perpetual admonitions to do nothing unworthy of it." John Adams, having been appointed minister to France, took with him as companion his son John Quincy, then in his 11th year. The voyage from Boston to Bordeaux was tempestuous; the travel by land from Bordeaux to Paris was rapid and fatiguing; but the young Adams, as appears from his father's published diary, conducted and sustained himself through both voyage and travels, and also during their residence at Paris, to his father's entire satisfaction. Placed at a school near Paris, he made rapid progress both in the French language and in his general studies. His health was perfect, and his father wrote to his mother that he attracted general attention wherever he went by his vigor of body, his vivacity of mind, and his constant good humor. After a stay in France of near a year and a half—several months of which were spent at Nantes waiting for a passage home—John Quincy Adams came back with his father in a French frigate. While at sea he taught English to his fellow passengers, the French ambassador to the United States, De la Luzerne, and his secretary, M. Marbois. The following is an extract from his father's diary, under date of June 20, 1779: "The chevalier de la Luzerne and M. Marbois are in raptures with my son. They get him to teach them the language. I found this morning the ambassador seated on the cushion in our stateroom, M. Marbois in his cot, at his left hand, and my son stretched out in his at his right, the ambassador reading out loud in Blackstone's 'Discourse' at his entrance on his professorship of the common law at the university, and my son correcting the pronunciation of every word and syllable and letter. The ambassador said he was astonished at my son's knowledge; that he was a master of his own language like a professor. M. Marbois said, 'Your son teaches us more than you; he has *point de grâce*, *point d'éloges*. He shows us no mercy, and makes us no compliments. We must have Mr. John.'" Character is very early developed, and John Q. Adams retained much of this same style of teaching to the end of his life. After remaining at home three months and a half, John Q. Adams, now in his 13th year, sailed again in the same French frigate, as his father's companion on his second diplomatic mission to Europe. Arriving at Paris in February, 1780, he was again placed at school, where he remained till August. He then went with his father to Holland, where, after some months' tuition at a school in Amsterdam, he was sent about the end of the year to the university of Leyden. His father's secretary of legation, Francis

Dana (afterward chief justice of Massachusetts), having been appointed minister to Russia, he took with him as his private secretary John Q. Adams, then in his 15th year. Having discharged the duties of this position for 14 months to Dana's entire satisfaction, the latter not having succeeded in getting recognized as minister, young Adams left St. Petersburg, and, travelling back alone, returned leisurely through Sweden and Denmark, and by Hamburg and Bremen, to the Hague, where he resumed his studies. In October, 1783, the treaty of peace having been signed, John Q. Adams attended his father on his first visit to England. Returning with him, he spent the year 1784 in Paris, where the whole family was now collected. His father having been appointed minister to Great Britain, he accompanied the family to London, but soon after, with a view to the completion of his education, returned home to Massachusetts. In 1786 he entered the junior class at Harvard college. He graduated in 1788, and immediately after entered the office of Theophilus Parsons, afterward well known as chief justice of Massachusetts. Here he remained for three years. In 1791 he was admitted to the bar, when he opened a law office in Boston, and in the course of four years he gradually attained practice enough to pay his expenses. He did not, however, confine himself entirely to the law. A series of articles which he published in the "Boston Centinel," with the signature of Publicola—a reply to some portions of Thomas Paine's "Rights of Man"—attracted a good deal of attention not only at home but in England, where these papers were republished and ascribed to his father. In another series of articles in the same journal, signed Marcellus, published in 1793, he defended Washington's policy of neutrality. In a third series, signed Columbus, published the same year, he reviewed the conduct of Genet, the French ambassador, in relation to the same subject. These writings drew attention toward him, and in May, 1794, Washington appointed him minister to the Hague. Upon his arrival there he found things in such confusion, owing to the French invasion, that after a few months' residence he thought of returning; but, by the remonstrances of Washington, who predicted for him a distinguished diplomatic career, he was induced to remain. In 1795 he had occasion to visit London to transact some business with Thomas Pinckney, who after Mr. Jay's departure had resumed the embassy at that court. The American consul at London was Joshua Johnson of Maryland, brother of Thomas Johnson, one of the signers of the declaration of independence, and a judge of the United States supreme court. Mr. Joshua Johnson had formerly been a merchant at Nantes, where in 1779 the Adamses had made his acquaintance. He had by this time a grown-up daughter, with whom young Adams now formed an intimacy, which resulted in marriage on July 27, 1797. Previously to this event, and shortly before the close of Washington's administration, John Q. Adams had been appointed minister to Portugal; but his father, on becoming president, changed his destination to Berlin. In thus promoting his own son, John Adams acted by the written advice of Washington, who expressed his decided opinion that young Adams was the ablest person in the American diplomatic service, and that merited promotion ought not to be withheld from him merely because he was the president's son. He arrived at Berlin shortly after his marriage, in the autumn of 1797. In 1798 he received an additional commission to negotiate a treaty of commerce with Sweden. While residing at Berlin, with a view to perfecting himself in the German language, he made a translation into English of Wieland's "Oberon," and would have published it but for the appearance about that time of a translation by Sotheby. In 1800 he travelled through Silesia, of which tour he wrote an account in a series of letters to his brother which were published, though without the writer's knowledge, in the "Port Folio," a weekly paper at Philadelphia. These letters were collected and published in a volume in London, and, being translated into French and German, had a wide circulation. On the accession of Mr. Jefferson to the presidency, John Q. Adams was recalled; but he had previously succeeded in negotiating a treaty of commerce with Prussia. Returning to Boston, he again opened a law office there. In 1802 he was elected from Suffolk county (which includes Boston) to the Massachusetts senate, and the next year was chosen by the legislature a senator in congress from Massachusetts. He owed this position to the federal party of Massachusetts, and for four years he continued to sustain their views; but on the question of the embargo recommended by Jefferson he separated from them. The Massachusetts election in the preceding spring had resulted in the success of the Jeffersonian party, who elected their candidates for governor and lieutenant governor, and a majority in both branches of the legislature. At the time when the embargo was proposed by the president to congress, it seemed probable that the question of Adams's reëlection to the senate would have to be decided by a legislature favorable to the views of the national administration; and the support which Adams gave to that measure was charged by the federalists to the hope of securing his reëlection and the favor of a party whose predominance seemed at length established, not merely in the nation, but in Massachusetts also. This course on his part led to a warm controversy between him and his colleague in the senate, Timothy Pickering, who now made the same charges of treacherous selfishness against the son which he had formerly brought against the father. Pickering addressed a letter to Governor Sullivan of Massachusetts, in which he forcibly stated his objections to the embargo, which he represented as the first step toward a war with Great Britain, a step into which the administration had been led, as he maintained, by French threats or French seduction. This letter Pickering requested the governor to lay before the legislature, which Sullivan refused to do, on the ground that it was "seditious and disorganizing." It found its way, however, into the newspapers, and Adams replied to it through the same medium. In this reply he expressed his conviction that the whole of the difficulties in which the United States were involved on the question of neutral rights, including the issue of Bonaparte's Berlin and Milan decrees, had originated in the unwarrantable maritime pretensions of Great Britain. He even went so far as to represent the late British orders in council, issued nominally in retaliation for the Berlin decree, as a first step on the part of Great Britain toward bringing back the United States to colonial subjection. Giving emphatic expression to suspicions and to an antipathy which, as to the Hamiltonian or Essex junto section of the federalists, he had imbibed from his father, he broadly hinted that Pickering and his special party friends were quite ready to side with Great Britain in the new enterprise which he ascribed to her of resubjecting America. Although Sullivan had been reëlected governor, the embargo had operated to give the federalists a small majority in both branches of the Massachusetts legislature; and when the question of the choice of senator came up, Adams was dropped, and Lloyd, a Boston merchant, chosen in his place. Adams thereupon declined to sit for the remaining short session of his term, resigned his senatorship, and retired to private life. He had previously, however, secured, in addition to his practice as a lawyer, a new resource and employment, in the post of professor of rhetoric and belles-lettres at Harvard college. He entered upon this professorship in 1806, upon condition of not being obliged to reside at Cambridge, and for three years following discharged the duties of it, delivering lectures, the first, it is said, ever read in any American college, and conducting exercises in declamation. His lectures, which were printed in 1810, once possessed a considerable reputation, but are now entirely neglected. The winter subsequent to his resignation he visited Washington, nominally for the purpose of attending the supreme court. During this visit he sought and obtained a confidential interview with Jefferson, in which he distinctly brought against a portion of the federal leaders the charge of a treasonable design of dissolving the Union and forming a separate northern confederacy. The same charge, thus privately made, he not long after repeated in print, in a review of the writings of Fisher Ames, which he published in numbers in the "Boston Patriot." Such was the origin of a charge which for the next ten or fifteen years strongly affected the administration of the government, and which, penetrating deeply into the popular mind, made the leading statesmen of New England objects at once of dread and hatred, deprived New England for a considerable period of its natural weight in public affairs, and had a decisive influence in curtailing to a single term the presidential office, to which John Q. Adams himself afterward attained. That he was sincere in bringing this charge there is little room for doubt. The proof, however, which he presented at the time or afterward of the truth of this plot, was sufficiently slender. It was said to have originated with a few federal members of congress, in consequence of the annexation of Louisiana—a measure which Adams had himself opposed, being one of the six senators who voted against it—and the threatened destruction, by the addition of so much new western and southern territory, of the political influence of the northern and eastern states. These dissatisfied members of congress, so Adams alleged, had proposed to have a meeting at Boston, at which Hamilton was to have been present. It was admitted that Hamilton disapproved of the scheme, and yet his reasons for accepting Burr's challenge were cited as proof that he anticipated a civil war and the being called upon to take a leading part in it. Such seems to have been about the whole of this alleged plot, carefully concealed, as Adams admitted, from the great body of the federalists, and unknown even to the greater part of their leaders, including one so conspicuous as Ames. We shall have occasion at a subsequent period of Mr. Adams's life to refer again to this subject. It should be added now, however, that this revelation was among the reasons by which Adams pressed Jefferson to consent to the repeal of the embargo, for which he had himself voted, but which had provoked in all the maritime parts of the country, and especially in New England, a very violent hostility, and which could not be persisted in, as Adams thought, without leading to open and violent resistance, and so affording opportunity to the plotters against the integrity of the Union. Immediately after Madison's accession to the presidency, he nominated Mr. Adams as minister to Russia. Since the time that Adams, while yet a boy, had visited St. Petersburg as private secretary to an unrecognized minister, the United States had had no ambassador at that court. The senate, not yet satisfied of the expediency of opening diplomatic relations in that quarter, though the same thing had been recommended by Jefferson, refused to confirm the nomination. However, a few months after, the nomination was renewed, and with better success. John Adams, who did not like being thus separated from his son, saw in this appointment only a sort of political banishment intended on the part of the Virginia politicians to remove a dreaded competitor out of the way. Yet in fact, by removing John Q. Adams from the immediate theatre of contention at home, it contributed not a little to his subsequent political promotion. He was himself, as we may judge, well satisfied to escape from the political commotion which he had raised; for when, after various unsuccessful attempts to fill a vacancy on the supreme bench of the United States, he was nominated and confirmed as a judge (for the New England circuit), in spite of the wishes of his father he declined the nomination, preferring to remain as ambassador at St. Petersburg, where he was now established with his family. He was well received in Russia. His official duties were not very arduous. Part of his leisure he employed in writing a series of "Letters," since published, addressed to his sons, on "The Bible and its Teachings"; a pious work, but not otherwise of particular value or merit. The disputes and collisions between Great Britain and the United States having finally terminated in war, through the influence of Mr. Adams the emperor of Russia was induced to offer himself as mediator, and in July, 1813, Adams was joined by Mr. Bayard, and afterward by Mr. Gallatin, those gentlemen having been appointed in conjunction with himself to negotiate a peace. Great Britain, however, refused to treat under the mediation of Russia. She proposed instead an independent negotiation at London or Gothenburg, for which Ghent was afterward substituted. This proposition having been accepted on the part of the United States government, Mr. Adams arrived at Ghent in June, 1814, and after a protracted negotiation of six months, in which Jonathan Russell and Henry Clay were associated, peace was finally concluded Dec. 24, 1814. No attempt whatever was made to limit the maritime pretensions of Great Britain, in resistance to which the war had originated, and against which Mr. Adams, in joining the administration party, had so decidedly pronounced. The skill and eloquence of the American commissioners found ample scope in warding off the pretensions of Great Britain to portions of territory occupied by her, or at least to act as protector to the Indian tribes within the limits of the United States. Some attempt was also made to limit our fishing rights, and Mr. Adams was now instrumental, as his father had been before him, in maintaining unimpaired our enjoyment of the ocean fisheries. Previous to proceeding to London to execute a new commission to negotiate in conjunction with Clay and Gallatin a treaty of commerce, Adams visited Paris, where he witnessed the return of Napoleon from Elba and the brief empire of the hundred days. Here his family joined him after a long and perilous journey from St. Petersburg, and on the 25th of May he joined Clay and Gallatin in London; in conjunction with whom, on July 13, 1815, he signed a commercial convention with Great Britain. This business finished, Adams still remained at London as resident minister.—Upon the accession of Monroe to the presidency (1817) he offered Mr. Adams the post of secretary of state, to fill which he returned home, after an absence of eight years. The reëstablishment of peace in Europe having removed former grounds of contention, a political lull had succeeded, and a new organization of parties now began to take place, especially on the subjects of protection to American manufactures and expenditures from the United States treasury for internal improvements. There still remained, however, to be disposed of, some questions of moment more immediately connected with Mr. Adams's position as secretary of state. Gen. Jackson, having been consulted on the subject by Monroe, had heartily approved of the appointment of Mr. Adams to that department. Adams no less warmly supported in the cabinet, against Mr. Calhoun's proposition of censure, the conduct of Gen. Jackson in invading Florida, hanging Arbuthnot and Ambrister, and taking military possession of St. Mark's and Pensacola. Those proceedings he also sustained with no less zeal in his diplomatic correspondence with the Spanish minister—an important correspondence, having reference to the boundaries of Florida and Louisiana, and the claims of America on Spain for commercial depredations. Though as a senator Adams had voted against the Louisiana treaty, on the ground that the federal constitution gave no power to acquire territory, he now as secretary of state pushed American claims under that treaty to the extremest lengths, insisting that this cession included not merely Florida to the Perdido, but Texas to the Rio Grande. Finally, in consideration of the cession of Florida, the United States agreeing to pay $5,000,000 for it, to be applied to the extinction of American mercantile claims against Spain, Adams compromised matters by agreeing to the Sabine, the Red river, the upper Arkansas, the crest of the Rocky mountains, and the parallel of 42° N. lat., as the boundary of Louisiana; and upon this basis a treaty was arranged. This treaty was his principal achievement as secretary of state. After some hesitation, Mr. Adams finally yielded to the policy warmly urged by Henry Clay of recognizing the independence of the late Spanish American colonies. An elaborate report which he made in his official capacity on weights and measures secured him the credit of extensive scientific acquirements. Toward the close of Monroe's first term came up the great question of the admission of Missouri as a slave state, and the extension of slavery or its prohibition throughout the unsettled territory north and west of Missouri. The Missouri compromise having at length, after violent agitations at Washington and throughout the country, received the sanction of congress, Monroe, upon being called upon to sign the bill, submitted two questions to his cabinet: First, had congress the constitutional power to prohibit slavery in a territory? and second, was the term "for ever," used in the prohibitive clause of the Missouri bill, to be understood as referring only to the territorial condition of the district embraced in it, or must it be understood to extend to such states as might be erected out of it? These questions grew out of the circumstance that the southern members of congress had denied any power in congress to prohibit slavery in a state, and therefore any right to refuse to admit Missouri into the Union on the ground that her constitution established slavery. Those of them who supported the compromise admitted, however, a power of imposing conditions on territories, as necessarily implied in the power to erect them. On the first of these questions all the cabinet declared themselves in the affirmative. As to the second question, Adams thought that the term "for ever" must be understood to mean for ever, and that the prohibition of slavery, instead of ceasing with the territorial condition of the district, would under the act of congress extend to any states that might at any time be erected out of it. The other members of the cabinet, including Thompson of New York (except Adams, the only other northern man in it, and soon after made judge of the supreme federal court), were all of opinion that the "for ever" in question was only a territorial for ever, and that it did not and would not operate to prevent any states that might be organized out of this territory from establishing or prohibiting slavery as they chose. But to prevent this delicate point from being mooted, and to give to the cabinet an appearance of unanimity, at Mr. Calhoun's suggestion the second question was modified so as to read, "Is the proviso as it stands in the bill constitutional?" To this question all the members returned the brief answer "Yes," and on the strength of their apparently unanimous opinion (ordered to be deposited in the archives of the state department, whence, like some other valuable historical papers, it has since disappeared), Monroe signed the bill. We owe this piece of secret history to an extract which has been published from Mr. Adams's diary, from which it also appears that he still strongly entertained the same sentiment of opposition to southern ideas, institutions, and predominancy, which had led him to vote against the annexation of Louisiana. But the time was not yet come for the open avowal of his opinions or for acting upon them. Least of all were the present crisis and Adams's position favorable to such a course.—No sooner had Monroe entered upon his second term of office (1821) than the question of who should be his successor began to be vehemently agitated. Of the five members of his cabinet, no fewer than three, Adams, Crawford, and Calhoun, were brought forward as candidates, as were also, outside the cabinet, Gen. Jackson and Henry Clay. Crawford obtained the congressional caucus nomination, according to the usage which then prevailed; but this nomination had no weight with the partisans of the other candidates. To support Adams, the federal party of Massachusetts—the only state in which that party could be said to maintain an organized existence, and even there it had lately lost the control of the state government—amalgamated with the democratic party of that state; and the same union took place throughout New England, and partially in New York, New Jersey, Delaware, and Maryland. All the federalists, however, did not come into this arrangement. Some of the more persistent among them refused to support Adams. The aged Timothy Pickering, his former senatorial colleague, made a violent attack upon him in a printed pamphlet, founded on his former separation from the federal party. As a general thing, however, the greater part of the old federalists throughout the country gave in their adhesion to Adams—a circumstance urged by his opponents as going to show that he was still but a federalist in a democratic disguise, and not entitled to the support of the democratic party. From the earliest history of the United States as an independent nation, Virginia and New England ideas had contended for predominancy and control. Notwithstanding his former abandonment of New England at the time of the embargo, in the present contest Mr. Adams represented the New England which was in fact synonymous with the federal idea. Of course he suffered greatly from that bitter dislike of New England, which in the preceding quarter of a century had been laboriously and assiduously instilled into the people not merely of the southern but of the western states, and which he had himself, as we have seen, contributed to aggravate. The election resulted in giving to Adams all the votes of New England, 26 votes from New York, 1 from Delaware, 3 from Maryland, 2 from Louisiana, and 1 from Illinois—84 in all; while Jackson had 99—those of Pennsylvania, New Jersey, Indiana, and 2 of the 3 votes of Illinois among the number. Crawford had 41, and Clay had 37, including the votes of Kentucky and Ohio. Calhoun, who had previously withdrawn from the contest, was chosen vice president almost unanimously. There being no choice by the people, the election came into the house, where, by the influence of Clay, Adams was chosen at the first ballot—13 states voting for him, 7 for Jackson, and 4 for Crawford. Jefferson, in a letter a few days before to John Adams, had characterized the decision between John Quincy Adams and Jackson—the only two candidates really before the house—as involving the question whether he and his correspondent were to end their days "under a civil or military government." It is probable that Jefferson's favorite candidate had been Crawford, who received the vote of Virginia; but by nobody had Jackson been more vehemently opposed as the backwoods, uncivilized, and military candidate than by the supporters of Crawford, who had painted in very strong colors the probable barbarizing consequences of Jackson's election. Crawford himself, in a subsequent letter to Clay, most decidedly approved of Clay's preference of Adams to Jackson. No sooner, however, had Adams entered upon the presidency (March 4, 1825), with Clay as his secretary of state, than a coalition was formed between the late supporters of Crawford and Jackson, with the understanding that Jackson should be their candidate, and with the resolute determination to break down the administration of Mr. Adams, and to prevent his reëlection. For this purpose no effort was spared. The Crawford presses, which had abused Jackson, now began to sing praises to him. Adams, considering himself the successor to Monroe in the regular democratic line, and wishing to impress that fact on the public, made few or no removals from office, and when vacancies occurred hardly ventured to appoint a single federalist—a proscription under which that party had labored now for a quarter of a century, and to which Adams's own charges and denunciations had in fact contributed. It was well known that as to this subject Jackson entertained very liberal views; in fact, that he had advised Monroe upon his accession to a much more liberal course in appointing federalists to office than Monroe had seen fit to adopt. Hence, especially in all those states where the opposition was predominant, many enterprising young federalists mustered to the side of Jackson, some of them even joining loudly in those charges of secret federalism against Adams, and in appeals to the long cherished prejudices against New England, which were conspicuous weapons in the party warfare of that day. The new party, assuming to themselves the title of democrats, refused to accord it to Adams and his supporters, to many of whom, indeed, it was not very agreeable, and who invented for themselves the new name of "National Republicans." Some of these young federalists, transformed so suddenly into democrats and Jackson men, hit upon another party expedient no less effective. Even before the election they had gone to Jackson with the story of a secret bargain between Adams and Clay, to result in Adams's election and Clay's appointment as secretary of state; and the charge of bargain and corruption thus originated, and taken up even by Jackson himself, was loudly reëchoed after the election, to the damage of both Clay and Adams. The new administration endeavored to strengthen itself by assuming the championship of internal improvements, which had hitherto been Calhoun's specialty, and of protection to domestic industry, of which Clay had been a leading advocate, and which just before Adams's accession had carried the enactment of the tariff of 1824. Although the tobacco and cotton growing states were strongly opposed to protection, yet that idea was at this time far too popular in the middle states to be repudiated. The supporters of Gen. Jackson, at least in the northern and middle states, represented him and themselves as in favor of a "moderate" and "judicious" tariff, as opposed to the high tariff policy which they ascribed to Adams and Clay. In this position of parties, all the free-traders north and south joined the opposition, including for the most part the powerful navigating interest of New England and the importing interest of New York, thus carrying over to that side a large additional section of the old federal party. Upon the internal improvement question, the opposition, notwithstanding that Calhoun was one of their principal leaders, took more decisive ground, going so far as to deny, as Crawford formerly had done in opposition to Calhoun, the constitutional authority of congress to vote money for that purpose. As additional means of affecting popular opinion, loud charges of extravagance were brought against the government, whose expenses, exclusive of the public debt, scarcely amounted to thirteen millions a year, and retrenchment and reform were loudly promised in case the opposition should triumph. This was for the people. To the politicians another more inviting lure was held out. From Adams's peculiar position in relation to those whom he found in office, he had, as we have seen, nothing in that way to promise his supporters. He did not even dare to remove men apparently hostile to him, while the opposition held out the prospect, in case of their triumph, of a general sweep of the present officeholders—at least of such as were not strongly on their side—and the distribution of their places as spoils to the victors—rewards, that is, for electioneering services. The debates of congress at this period were largely made up of electioneering harangues; and to give free scope to the remarks of John Randolph and other opposition senators, Mr. Calhoun started and acted upon the idea that as presiding officer of the senate he had no authority to call any senator to order. It was in vain to struggle against this combination, which, in the latter part of Mr. Adams's presidential term, had a majority against him in both houses of congress. Nor was his administration any more fortunate in its exterior relations. The congress of Panama, from which much had been hoped in the way of placing the United States at the head of a great American confederacy, was substantially defeated, as to any participation of the United States in it, by the delays induced by the opposition, while an unlucky quarrel with Great Britain as to trade with the West Indies ended in the entire suspension of that traffic. It appears also that an attempt was made by Clay and Adams to purchase Cuba—a measure which might have proved very acceptable at the south, but Spain totally refused to listen to their offers. As against the solid combination of the opposition, supported by the name and prestige of the old democratic party, the game had been a desperate one from the beginning. In the eastern states Mr. Adams was pretty well able to hold his own, and in those states, at the second election, he obtained about as many votes as before. But Kentucky and Ohio, in which the popular feeling against New England was greatly embittered, altogether failed him. Mr. Clay was unable to help him to a single vote. In this desperate emergency, finding his office slipping from under him, Mr. Adams made a most unfortunate effort to retrieve his falling fortunes, in the shape of a letter addressed to the electors of Virginia, in which he claimed their votes on the ground of his services twenty years before in exposing and frustrating the alleged New England plot, which we have already referred to, to dissolve the Union. This ill-judged letter, while it did not gain him a single vote, left him to retire to Quincy (1829)—where he had now become possessor of his father's estate, largely augmented by his own shrewd management—with a new personal and political quarrel on his hands, and with hard feelings and personal antipathies against him, which for a long time had been in abeyance, thus unseasonably revived by himself. Shortly after his return to Massachusetts a correspondence ensued between him and a number of the old federalists and their representatives, which did not tend to mollify matters. No new light was thrown on the alleged plot, though Mr. Adams is understood to have written a book or pamphlet on the subject, which however he refrained from publishing, on the judgment of some friends to whom he submitted it, that it would not better his case. After having successfully kept the political seas for nearly forty years, and that in very stormy times, Mr. Adams was at last stranded, as it seemed, high and dry on a political lee shore. He addressed himself for the moment to arranging the papers and preparing a life of his father; but the fragment of this work which his son has incorporated in his life of his grandfather does not make us regret that he soon abandoned it. He had been a versifier from his youth, and he now published a rhymed performance of some length, founded on the story of the conquest of Ireland ("Dermot McMorrogh," Boston, 1832); but this palpably was not a field in which he was likely to gather laurels.—Though Mr. Adams had now reached an age at which many politicians have voluntarily retired, he had in his temperament too much of innate vigor and indefatigable activity, and too much of the stormy petrel in his character, to make him willing to leave that political vocation to which, both by nature and habit, he was so specially adapted. In fact, the great work of his life remained to be performed. The anti-masonic excitement consequent on the disappearance and alleged murder of William Morgan had, about this time, introduced a new element into the politics of western New York, whence it had spread into Vermont, Massachusetts, Pennsylvania, and in a less degree into other states. This excitement had taken a strong hold of the congressional district in which Mr. Adams lived, and he himself exhibited a deep interest in it. He signalized his zeal against secret societies by exerting himself to procure the abolition of some passwords and secret signs which formed a part of the ceremonial of the Phi Beta Kappa, a literary society of which branches existed in Harvard and other colleges; and under these circumstances the anti-masons of his district brought him forward as a candidate for congress. He accepted the nomination, and was chosen without opposition, and continued to represent the district till his death, 17 years after. The mass of those who had been his supporters for the presidency had looked, since his failure of a reëlection, to Mr. Clay as their head and leader. Mr. Adams entered congress in December, 1831, without party or followers, but in a more independent position than he had ever yet occupied. Shortly after his return to public life he was nominated by the anti-masons as their candidate for governor of Massachusetts. The politics of Massachusetts were at that time in a very disorganized state, and a strong effort was made by the Everetts and other personal friends of Mr. Adams, and was favored by Mr. Webster, to induce the so-called national republican party to accept the nomination of Mr. Adams thus made. But for the feeling against him which his Virginia letter had aroused among the old federalists, this effort would probably have been successful. As it was, the national republicans as well as the supporters of the administration each nominated a separate candidate for governor. There was no choice by the people, but as the national republicans carried a majority in the legislature, their candidate, John Davis, was elected over Adams's head (1834)—a disappointment which tended to place him in a still more independent political position. He gave, however, a general support in congress to that party which had sustained his own administration. He strongly opposed the nullifiers; yet, as chairman of the committee on manufactures, he strove to discover some middle ground on which the vexed question of the tariff might be satisfactorily settled. On the question of the removal of the deposits he went with the party which now began to take the name of whigs—including in that denomination not merely the old national republicans, but a certain number, especially at the south, of deserters from the Jackson ranks. In the affair of the dispute with France in 1835, about the delay in paying the indemnity, which had been stipulated by treaty, for maritime spoliations in Bonaparte's time, true to his pugnacious temperament, he supported Jackson's proposition for issuing letters of marque and reprisal, no less energetically than he had formerly supported Jefferson's embargo; and by a very singular coincidence, this course, like that, cost him a seat in the United States senate. At this very time the Massachusetts legislature were employed in filling an approaching vacancy in that body. Mr. Adams's friends had brought him forward as a candidate, and he was more than once chosen by the state senate. The house, however, did not concur, but proposed John Davis instead. This question was still pending, with a fair prospect of a decision in Adams's favor, when his speech in favor of reprisals on France, which did not correspond with the sentiment of Massachusetts, caused him to be abandoned by his supporters in the state senate, and led to the election of Davis, who had before beaten him as governor. Thus again forcibly cut loose from all party connections, Mr. Adams was left at liberty to follow the bent of his own daring and energetic spirit. The abolitionists had now begun to appear on the political stage, but in the prevailing anxiety to avoid giving offence to the South, reference was seldom made to them on the floor of congress except with disclaimers of sympathy, if not with expressions of detestation. The measure principally employed by the abolitionists at that time was the presentation of petitions for the abolition of slavery in the District of Columbia and the territories. To get rid of this importunity, congress had adopted rules which were maintained by Mr. Adams to be inconsistent with the right of petition itself. In this emergency he stepped forward as the champion and guardian of that right. Though he had taken the position of being opposed to the legislation asked for by the abolitionists, as not seasonable or expedient for the moment, he still insisted on their right to be heard. Upon this point he fought for years a battle which drew all eyes upon him as the representative of a principle which found in him an unflinching advocate and indefatigable champion. This new and eminent position was one which Mr. Adams was perfectly adapted to fill. With an iron constitution, strengthened by an active and abstemious life, there was, during his long term of service in congress, not a single member who equalled him, notwithstanding his great age, in capacity for application and powers of endurance; certainly not one whose attendance upon the business of the house was so exact and unremitting. In acquired knowledge, whether by books or personal experience, he far surpassed any of his fellow members; and what was of greater consequence, his stores of knowledge were always at hand and ready for use. Though his voice was weak, in consequence of which the members usually crowded about him when he spoke, he never became exhausted with fatigue; and though his manner was not pleasing and had little variety, yet the peculiar views which he took, and the copiousness and novelty of his illustrations, always held his audience in profound attention. Though he had the appearance often, especially to strangers, of speaking in a passion, at least in ill humor, and of laboring under a degree of excitement, he was in fact perfectly self-possessed, and in the midst of the storms and tumults which he raised about him never lost in the slightest degree his own self-control. We have no space to dwell on the history of his congressional career, which would fill a volume; but we must not omit to notice his defeat, in February, 1837, of his opponents on the question of a censure upon him for sending up to the speaker a petition purporting to come from slaves, as one of the most signal instances of his triumph. His undaunted bearing, his courage and determination, which no threats and no tumults could suppress, soon drew around him, as a moral aid and support, a body of external applauders and admirers; so that from this time forward he became the representative not merely of one of the districts of Massachusetts, but of a great embryo party, the party in fact of northern sentiments and ideas, a party which he himself had contributed his share toward burying under ground, but which he now labored night and day to help emerge again into life. Nor did Mr. Adams confine his labors on this question to congress. In the famous Amistad case —the case of certain newly imported Africans, who, while being transported from one port of Cuba to another, had made themselves masters of the vessel and had escaped to the coast of the United States—he appeared in the federal supreme court as counsel for the Africans, in opposition to the claim set up by their Spanish purchasers from whom they had escaped; a claim zealously urged not merely by the Spanish government, but covertly also by Mr. Van Buren, then president of the United States. Indeed, he seldom declined any occasion in his power of addressing an audience. The following may serve as a specimen: He left Boston one Monday morning to attend the opening of congress. That same evening he delivered an address before the young men's institute in Hartford, and the next evening a similar lecture before a similar institute in New Haven. On Wednesday evening he lectured before the New York lyceum; on Thursday evening he delivered an address in Brooklyn, and on Friday evening another lecture in New York, whence he proceeded next day to Washington to be present at the opening of congress on the following Monday. Though greatly engrossed by the subject of slavery, he did not confine his attention to it. Few leading topics came before the house on which he did not speak. In the organization of the house in December, 1839, which had been delayed for four days by the persistency of the clerk in undertaking to reject certain members from New Jersey who had certificates of election, but as the clerk thought improperly granted, Mr. Adams finally intervened with great energy and effect, and to general satisfaction. It was chiefly through his activity and perseverance that the Smithsonian institution was organized. In 1845 the obnoxious "gag rule," originally enacted in 1836, was rescinded, and from that moment Mr. Adams somewhat relaxed his zeal and labors. He began, indeed, to feel at last the effects of age. His health had been somewhat shaken by a heavy fall in the house of representatives, caused by his foot catching in the floor matting, by which his shoulder was dislocated and a severe contusion inflicted on his forehead. It rendered him for the moment insensible, and though it did not prevent his appearance the next day in his seat, he suffered permanently from it. On Nov. 26, 1846, just as he was about to leave Boston for Washington, he experienced a shock of paralysis which kept him from his seat for the next four months. After this he attended congress regularly, but seldom spoke. On Feb. 21, 1848, he had a second attack while occupying his seat in the house. He was taken to the speaker's private room, where he remained in a state seemingly of unconsciousness, though with occasional incoherent utterances, till the 23d, when he expired. His last words are said to have been, "This is the last of earth; I am content."—In addition to his voluminous speeches in congress, many of which were written out by himself, on various subjects, a great number of his acknowledged publications appeared in his lifetime. He left behind him a very voluminous diary, extending from his early youth to his death, one or two valuable fragments from which have already appeared. His journal, which is in the hands of his son, is regarded as a great political treasure. He wrote with great fluency, his manuscript seldom presenting an erasure, but he lacked altogether that idiomatic elegance, force, and simplicity so conspicuous in his father, instead of which his style is swelling, verbose, inflated, and rhetorical. He lacked also, though not without powers of sarcasm, the wit and fancy which sparkled in his father's writings, and still more that spirit of philosophical generalization into which John Adams constantly fell, but which was totally foreign to the intellectual constitution and habits of the son. John Quincy Adams had more learning perhaps, but John Adams had much more genius. In energy, spirit, firmness, and indomitable courage, John Q. Adams was his father's equal; in self-command, in political prudence, and even perhaps in capacity for hard work, his superior. Both will live for ever as representatives and embodiments of the spirit and ideas of New England during the periods in which they figured. In some respects John Q. Adams was far more fortunate than his father. The brilliant period of his career was toward its close. The longer he lived the higher he rose, and he died as such men prefer to die, still an admired and trusted champion, with harness on his back and spear in hand. Yet his whole political career, taken together, hardly presents to the close observer a character so uniformly brilliant and unspotted, and so free from the taint of selfishness, as that of his father. In personal appearance, and in general temperament and character, the resemblance between the father and the son was close. Both had very strong feelings and warm prejudices, though of the two John Quincy appears to have been the less vehement by nature, and also the better under control. Like his father, he was an economical housekeeper and judicious financier, and he died in possession of a handsome estate.—See "Life and Public Services of J. Q. Adams," by William H. Seward (12mo, Auburn, 1849), and "Life of J. Q. Adams," by Josiah Quincy (Boston, 1858).

ADAMS, Nehemiah, D. D., an American clergyman, born in Salem, Mass., Feb. 19, 1806, died Oct. 6, 1878. He graduated at Harvard college in 1826, studied divinity at Andover, settled as colleague pastor with the Rev. Dr. Holmes over the first Congregational church in Cambridge, Dec. 17, 1829, and was installed as pastor of the Essex street church in Boston, March 26, 1834. He took an active part in the controversy with the Unitarians, and published several works of a polemic and devotional character. The principal of these are: "Remarks on the Unitarian Belief," "The Friends of Christ in the New Testament" (Boston, 1853), and "Life of John Eliot." He was also a frequent contributor to the "Spirit of the Pilgrims," a religious periodical (Boston, 1826-'33), devoted to the defence of the puritan faith against the encroachments of modern liberalism. He has also published "Christ a Friend," "Agnes and the Key of her Little Coffin," "Bertha and her Baptism, or the Early Saved," works of religious consolation for the afflicted. In 1853 Dr. Adams spent a winter, for the benefit of his health, in Savannah, Georgia, on the plantation of a wealthy slaveholder; and on his return he wrote "A South Side View of Slavery" (1854), in which he gave a highly favorable description of the institution, and especially of its influence on the religious character of the slave. He also published a correspondence on the same subject with Governor Wise of Virginia. After 35 years of pastoral labor with the Essex street church, in 1869, in consequence of failing health, he resigned his pastorate. His people refused to accept his resignation, but procured an associate minister, and gave him a long leave of absence, which he employed in making a voyage round the world, spending much time in the Sandwich Islands. He returned in 1871 with improved health.

ADAMS, Samuel, a leading actor in the American revolution, born in Boston, Sept. 27, 1722, died Oct. 2, 1803. His grandfather was a grandson of Henry Adams, the same emigrant from England to Massachusetts from whom John Adams, second president of the United States, traced his descent. These two illustrious coöperators in the American revolution had both the same great-grandfather, a son of Henry Adams. He was prepared for college at the Boston Latin school, then taught by the elder Lovell, and entered at Cambridge in 1736. Previous to the revolution the names of the graduates of Harvard college are arranged in the college catalogue, not alphabetically, but in an order of precedence according to the estimated rank of their families. In a class of 24, John Adams held the 14th place; Samuel Adams, in a class of 22, the 5th. The Boston branch of the Adams family would seem to have attained to a somewhat higher colonial position than the branch which remained at Braintree. He was graduated A. B. in 1740. His father, Capt. Samuel Adams, had urged his entering the ministry; but he had no taste for this calling, and on leaving college began the study of law. This he relinquished to take a place in the counting house of Mr. Thomas Cushing, where, though active and industrious enough, he displayed conspicuous inaptitude for trade. He began business for himself, and failed. Subsequently he became a partner with his father in a brewery, and after Capt. Adams's death in 1748 he carried on the concern himself. About 1740 Capt. Adams became involved in pecuniary misfortunes through his connection with a banking speculation known as the land bank or manufactory scheme. In efforts on behalf of the unfortunate speculators in this scheme, Samuel Adams found an early introduction to politics, which ultimately became the chief interest and principal employment of his life. Fully to understand the first connection of Samuel Adams with politics, a brief retrospect becomes necessary. The use of paper money, first introduced into Massachusetts in 1690, and which had speedily driven coin out of circulation, had, in consequence of over-issues, been attended with great depreciation and fluctuations of prices. These issues were made for limited periods, and in consequence of the remonstrances of the English merchants trading to America, orders had been sent to Governor Belcher to agree to no new ones. The circulating paper being gradually absorbed, and the year 1741 being fixed for its complete withdrawal, the effect of this operation was much like that of a bank contraction of our day. The Boston merchants, and indeed the body of the people, complained bitterly of the scarcity of money, and an attempt was made to force Governor Belcher, by withholding his salary, to consent to new issues, or to extend the period of the old. As he proved inflexible, two joint-stock banking companies had been got up: one, called the "silver scheme," proposed to issue £110,000 in notes, redeemable in silver at the end of 10 years; the other, called the land bank or "manufactory scheme" (that in which Adams's father was concerned), undertook to circulate £150,000, which was to be redeemed at the end of 20 years in colonial produce. The "silver scheme" was patronized by the merchants and traders, the land bank by the farmers and mechanics. Belcher zealously opposed both. In spite, however, of the governor's proclamation, notes were issued by both companies, and those of the land bank especially were largely pushed into circulation. That company had 800 stockholders, and held complete control of the Massachusetts house of representatives. Belcher even apprehended an insurrection to compel him to give his consent to the scheme, and his opponents did succeed in obtaining his removal. But this did not avail them, for the operation of these two Massachusetts banks was cut short by an act of parliament extending to the colonies an act of the previous reign, occasioned by the South sea and other bubble schemes, which prohibited the formation of unincorporated joint-stock companies with more than six partners. The two banking companies were thus compelled to wind up; the partners were held individually liable for the notes, and the "manufactory scheme" especially, the affairs of which remained unsettled for several years, proved ruinous to the few partners who had anything to lose, of whom Adams's father was one. This act of parliament was denounced by the friends of the banks as a violation of the chartered rights of Massachusetts. The young Adams thus entered upon politics as the opponent of parliamentary authority, and as a champion for the body of the citizens—a position which, to a certain extent, his father seems to have occupied before him. How strongly his mind was turned in this direction, appears from the subject he chose for his thesis upon taking his degree of A. M. He proposed as a question, "Whether it be lawful to resist the supreme magistrate, if the commonwealth cannot otherwise be preserved?" as to which he supported the affirmative. Not succeeding in business, he obtained the post of tax collector for the town of Boston, an office which brought him into contact and acquaintance with all the inhabitants, and which obtained for him from his political opponents the cognomen of Samuel the Publican. During the administration of Governor Shirley he was steadily in the opposition. Against Bernard—his influence increasing with his age—he took a still more decided part. From an entry in John Adams's journal, under date of February, 1763, it seems that at that time there were in Boston two clubs—one the "Merchants' Club," the other the "Caucus Club"—accustomed to meet and agree upon persons to be supported for town officers, and that the caucus club used to send committees to consult and agree with the merchants' club as to men and measures. Of this caucus club—a corruption probably of caulkers' club, as having been originally composed of ship-building mechanics—Samuel Adams was then and long had been an active member. Gordon, indeed, traces back the existence and influence of this club to the time of Adams's father. Adams took an active part in all town meetings, at which his energy and courage made him a leader. The instructions given by the town of Boston, in May, 1764, to their newly chosen representatives—the first decided protests from any part of America against Grenville's scheme of parliamentary taxation—were drawn up by him; and he was chosen the next year as one of the three representatives in the general court of the town of Boston, a position which he held for nine years following. Upon his entry into the house he accepted the office of clerk, which not only produced him a small addition to his limited income, but enabled him also to exercise a certain influence over the course of proceedings. The Massachusetts house of representatives consisted at this time of upward of a hundred members, the most numerous assembly in the colonies. Its debates had begun to attract attention, and a gallery was now first erected for spectators. Besides taking a leading part in the debates, it devolved upon Adams to draw the larger part of the papers put forth by the house in its controversies with Bernard and Hutchinson—an office for which his fluent and eloquent pen, and the mixture in his character of caution with fire, courage, and decision, admirably fitted him. The following account of Samuel Adams, sketched from the life at the period of his entering the house, is found in the diary of John Adams, under date of Dec. 23, 1765: "Adams is zealous, ardent, and keen in the cause; is always for softness, delicacy, and prudence when they will do, but is stanch and stiff and strict and rigid and inflexible in the cause." A previous paragraph had sketched Gray, who afterward joined the tory party, and Thomas Cushing. After a sketch of James Otis, the diary adds: "Adams, I believe, has the most thorough understanding of liberty and her resources in the temper and character of the people, though not in the law and constitution, as well as the most habitual radical love of it, of any of them; also the most correct, genteel, and artful pen. He is a man of refined policy, steadfast integrity, exquisite humanity, fair erudition, and obliging, engaging manners, real as well as professed piety, and a universal good character, unless it should be admitted that he is too attentive to the public and not enough so to himself and his family." Governor Hutchinson—a no less competent observer, but who looked at Adams from an entirely opposite point of view—gives in the 3d volume of his "History of Massachusetts" substantially the same account. He sets down Samuel Adams as the most artful and insinuating politician he had ever known, and the most successful "in robbing men of their characters and calumniating the servants of the crown." He accuses Mr. Adams of "defalcation" as collector of taxes, the only foundation for the charge being that in a period of general commercial distress he had failed to collect the full amounts levied upon the citizens; and Hutchinson adds, by way of comment, "The benefit to the town from his defence of their liberties he supposed an equivalent to his arrears as their collector." While Adams thus devoted himself to politics, it was chiefly the industry and economy of his wife that supported the family. He had married in 1749 Elizabeth, daughter of the Rev. Samuel Checkley of Boston. She died in 1757, and in 1764 he married Elizabeth Wells, daughter of an English merchant who had settled in Boston in 1723. Though poor, Adams was incorruptible. It had been proposed to silence him by the gift of some place under government; but Hutchinson in a letter to England declared that such was his "obstinacy and inflexible disposition," that no gift nor office would ever conciliate him. The passage of Townshend's act in 1767, and other acts of parliament which evinced a determination to raise a parliamentary revenue in America by taxes on trade, brought the colonists in a body to the ground that taxes on trade, if designed to raise a revenue, were just as much a violation of their rights as any other tax. Adams took a leading part in urging these views, and the petition of the Massachusetts general court to the king agreed to on this occasion, their letter of instruction to their agent in England, and a circular letter addressed to the speakers of the popular branch of the several colonial assemblies, inviting consultation and mutual coöperation for the defence of colonial rights, were all from his pen. Hutchinson states that as early as 1769, some objections having been made to a motion pending in a Boston town meeting that it savored of independence, Adams wound up a speech in defence of it with this bold declaration: "Independent we are, and independent we will be." Upon the occasion of the so-called Boston massacre in March, 1770, Samuel Adams was appointed chairman of a committee to wait upon the governor and council with the vote of a town meeting, to the effect that nothing could restore order and prevent blood and carnage but the immediate removal of the regular troops, who, instead of encamping, as had formerly been usual, on the fortified island in the harbor, known as Castle island, had for the last 18 months, to the great annoyance of the inhabitants, been stationed in the town. Adams entered the council chamber at the head of the committee and delivered his message. Col. Dalrymple, the commander of the troops, was present, as was the commander of the ships of war in the harbor. In reply to the vote of the town presented by the committee, Lieutenant Governor Hutchinson disclaimed any authority over the soldiers; to which Adams replied by referring him to that clause in the provincial charter which declared the governor, or in his absence the lieutenant governor, commander-in-chief of all the military and naval forces in the province. After a consultation with Dalrymple, Hutchinson replied that the colonel was willing to remove one of the regiments if that would satisfy the people. "Sir," said Adams, "if the lieutenant governor, or Col. Dalrymple, or both together, have authority to remove one regiment, they have authority to remove two; and nothing short of the departure of the troops will satisfy the public mind or restore the peace of the province." The energy of Adams prevailed, and both regiments were sent to the castle. The destruction of the tea attempted to be forced on the colonies, the passage of the Boston port bill and of the bill modifying the Massachusetts charter, and the appointment of Gen. Gage as governor at the head of an army, brought things to a crisis. As Gage entered the harbor of Boston, May 13, 1774, a town meeting at which Adams presided was in session, assembled to take the port bill into consideration, news of which had just arrived. At the June meeting of the general court a continental congress was proposed to assemble at Philadelphia, to which the representatives appointed five delegates, of whom Adams was one; and Gage having thereupon suddenly dissolved the court, the patriots immediately began to organize a distinct government of their own. Transferred thus to Philadelphia, and from the Massachusetts general court to a continental congress, Adams began now to act on a broader scene. His first act was one of conciliation. He was himself a strict Congregationalist, and the recent attempts to extend Episcopacy in America, and the controversy thence arising, had produced a good deal of feeling. A motion by one of the Massachusetts delegates to open the proceedings of the congress with prayer was opposed by Mr. Jay, one of the delegates from New York, on the ground that as there were in that body Episcopalians, Quakers, Anabaptists, Presbyterians, and Congregationalists, they would hardly be able to join in the same act of worship. Thereupon "Mr. Samuel Adams arose"—so wrote John Adams in a letter to his wife describing the scene—"and said he was no bigot, and could hear a prayer from a gentleman of piety and virtue who was at the same time a friend to his country. He was a stranger in Philadelphia, but he had heard that Mr. Duché deserved that character, and therefore he moved that Mr. Duché, an Episcopal clergyman, might be desired to read prayers to the congress." The motion passed, and Duché, at that time the most popular preacher in Philadelphia, appeared the next morning and officiated with great unction. He acted as chaplain to congress for several sessions, but when the British occupied Philadelphia he abandoned the cause of his country, and even had the impudence to write Washington a letter exhorting him to the like piece of treachery. Adams's motion, however, was very well timed. It not only pleased the Episcopalians, a powerful body in New York and predominant at the south, but it also secured for the moment Duché himself, whose example was not without its effect upon others. In this congress and those which followed, Adams, who continued a member for eight years, took an active, decided, and influential part. No one man, perhaps, did so much as he to put the revolution in motion, and to bring about the separation from the mother country, to which, indeed, Gen. Gage bore testimony in excepting him, along with Hancock, from his offer of pardon in case of submission. In administrative talents, however, he was not so conspicuous; and the line of policy which he supported in congress was rather graduated to accord with the feelings, sentiments, and sometimes the prejudices of the people, than always calculated to meet the actual exigencies of affairs. Together with John Adams he took an active part in the formation of the state constitution of Massachusetts, adopted in 1780. He was a very influential member of the Massachusetts convention called in 1788, to consider the federal constitution; and though opposed to many of its features, he was finally persuaded, along with Hancock, to give it his support, in consideration of certain proposed amendments, of which several were afterward adopted. This decision of the question, so far as Massachusetts was concerned, was of the greatest moment, involving in it the action of other states, and in fact the fate of the new government. The next year Adams was chosen lieutenant governor of Massachusetts, which office he held till 1794, when he was chosen governor as Hancock's successor. He was a warm admirer of the French revolution, and in national politics leaned decidedly to the republican or Jeffersonian party. It was this circumstance, no less than his increasing age and infirmities, that induced him in 1797, the federal party being predominant in Massachusetts, to decline serving longer as governor, and to retire to private life.—A highly characteristic portrait by Copley, which hangs appropriately in Faneuil Hall, has transmitted his features to us. Memorials of his life and service are to be found scattered through the writings of John Adams, who in his old age exerted himself to recall public attention to his colleagues of the revolutionary times. Sullivan, in his "Familiar Letters on Public Characters," describes Samuel Adams as "of common size, muscular form, light blue eyes, fair complexion, and erect in person. He wore a tie wig, cocked hat, and red cloak. His manner was very serious. At the close of his life, and even from early times, he had a tremulous motion of the head, which probably added to the solemnity of his eloquence, as this was in some measure associated with his voice. Having inherited no fortune, and being without a profession, he was, almost down to the close of his life, without resource except in the salaries and emoluments of office, never large, and only eked out by the industry and economy of his wife. Yet those who visited his house found nothing mean or unbecoming his station, since he knew how to combine decency, dignity, and propriety with a small expenditure. At a late period of his life he obtained a competency, but only by a very afflicting event—the death of his only son, of the same name with himself, who, having graduated at Harvard college in 1771, had studied medicine with Dr. Joseph Warren (the famous general), had served as a surgeon through the revolutionary war, and returning home with a broken constitution, had died in 1788. The avails of his claims for services in the army gave his father a competency in his declining years.—In one respect—indeed in many, but we can here refer only to one—there was a remarkable contrast between Samuel and John Adams. Both, true to their New England origin, were theologians; but John Adams, while to a certain extent a conservative in politics, was quite a neologist in religion. The Arminian heresies of his youthful days had prevented him from studying divinity, and in the correspondence of his extreme old age he appears almost as much a freethinker as Jefferson himself. Samuel Adams, on the other hand, though to his last days a progressive in politics, was always a decided conservative in religion, adhering with sincere persuasion and firm tenacity to the five points of Calvinism. Nor did this strictness limit itself to doctrine. "At a time," says Edward Everett, "when the new order of things was inducing laxity of manners and a departure from the ancient strictness, Samuel Adams clung with greater tenacity to the wholesome discipline of the fathers." But Mr. Everett scarcely does justice to Mr. Adams's spirit of sociality when he adds, "His only relaxation from business and the cares of life was in the indulgence of a taste for sacred music, for which he was qualified by the possession of a most angelic voice and a soul solemnly impressed with religious sentiment." He was, on the other hand, fond of conversation, and possessed himself a large fund of anecdote.—Besides the state papers of which Adams was either wholly or mainly the author, and his numerous political contributions to the newspapers, of which, however, but few have been identified, there have appeared in print a number of his letters. An oration on American independence, purporting to have been delivered by him in Philadelphia Aug. 1, 1776, and printed in London, is probably spurious, though it is a very favorable imitation of his style, neat, forcible, and pointed, without the least inflation or appearance of effort. In this oration the writer gives the English the title of a "nation of shopkeepers," and it is not impossible that it was hence that Bonaparte borrowed this appellation, which was a favorite one with him, since it is known that the oration was translated into French and published at Paris. Adams's life has been written by W. V. Wells ("Life and Public Services of Samuel Adams," 3 vols. 8vo, Boston, 1865). He left only female descendants, and the name of Adams is no longer borne by any of his blood.

ADAMS, William, D. D., an American clergyman, born in Colchester, Conn., Jan. 25, 1807. He received his early education from his father (see ADAMS, JOHN, LL. D.), when principal of Phillips academy, Andover, Mass., and graduated at Yale college in 1827. He studied theology at Andover, and in February, 1831, was ordained as a Congregational minister and pastor at Brighton, Mass. In 1834 he was called to the charge of the Central Presbyterian church, New York city. He has since that time been identified with the Presbyterian church, and has been (1872) for 38 years the pastor of the same congregation, which since 1853 has been known as the "Madison Square Presbyterian Church." He early attained reputation as a pulpit orator, and has been very prominent in the national benevolent societies. He was moderator of the New School general assembly of 1852, and was active in promoting the reunion between the Old and New School churches in 1870–'71. Besides occasional sermons, addresses, orations, and articles in the reviews, he has published "The Three Gardens: Eden, Gethsemane, and Paradise" (1859); an edition of Isaac Taylor's "Spirit of Hebrew Poetry," with a biographical introduction (1861); "Thanksgiving: Memories of the Day, and Helps to the Habit" (1865); and "Conversations of Jesus Christ with Representative Men" (1868). In 1871 Dr. Adams was elected professor of sacred rhetoric and pastoral theology in the Union theological seminary, New York, but declined the appointment.

ADAMS, William T. (pseudonyme, OLIVER OPTIC), an American writer of juvenile books, born in Medway, Mass., July 30, 1822. He was for many years a public school teacher in Boston, and now edits "Oliver Optic's Magazine for Boys and Girls." His principal works are "The Boat Club," "Woodville," "Army and Navy," "Young America Abroad," "Starry Flag," and "Lake Shore" series of stories, the "Riverdale Story Books," and "In Doors and Out," a volume of domestic tales.

ADAM'S PEAK, or Hamazel, a conical mountain in S. Ceylon, 45 m. S. S. E. of Colombo, 7,420 ft. high, and, with the exception of Pedrotallagalla (which exceeds it by 860 ft.), the highest in the island. The ascent is made by means of a chain fixed to its summit. It is considered sacred by both Buddhists and Mohammedans, who make frequent pilgrimages there during the dry season (January, February, and March). On the summit, which is surrounded by a wall 5 ft. high, with two openings for the admission of pilgrims, there is the impression of a gigantic foot in the rock, said by the natives to be that of Buddha when he stepped from this peak to the adjacent kingdom of Siam; but ascribed by the Mohammedans to Adam after his expulsion from paradise (placed in the vicinity of Ceylon), whence the peak derives its name.

ADANA, a town of Turkey, in S. E. Asia Minor, capital of a sanjak, on the river Sihun (anc. Sarus), 25 m. N. E. of Tarsus and 60 m. N. W. of Alexandretta; pop. about 30,000. It commands the Cilician passes of the Taurus chain, is well built, and contains interesting ancient remains. The bridge across the Sihun at this point is reported to have been constructed by Justinian, and the castle is also notable. Wool, cotton, corn, wine, and fruit are the staples of its commerce. Pompey colonized the town with conquered Cilician pirates. From 1833 to 1839, in consequence of Ibrahim Pasha's victory at Konieh, the sanjak was in the hands of the Egyptians.

ADANSON, Michel, a French naturalist, of Scotch descent, born at Aix, April 7, 1727, died in Paris, Aug. 3, 1806. At the age of 21 he went at his own cost, though of very limited fortune, to the French colony of Senegal to study nature. After five years he returned to France with a fine collection. He first attacked the Linnæan method, and his writings paved the way for the acceptance by the scientific world of Jussieu's system. The generic name *Adansonia* was given in his honor to the baobab tree, of which he gave the first scientific account. He was also distinguished for philanthropy, and proposed to found a colony with free negroes in Senegal, which was not, however, favored by the ministry of Louis XV. His name is associated with a plan for a vast cyclopædia of natural history, which the academy had not the courage to take up. He, however, persisted in his ideas, devoting many years to the collection of immense masses of manuscript material. By the revolution he was stripped of everything, and reduced to such abject poverty, that when he was invited in 1798 to take his seat as a member of the reorganized institute (having been a member of the academy since 1759), he was obliged to decline for want of shoes. He afterward received a small pension, in the enjoyment of which he died in his 80th year. His principal works are: *Histoire naturelle du Sénégal* (1 vol. 4to, 1757, including *L'Histoire des coquillages*, the earliest attempt at a scientific classification of shells according to their inhabitants), and *Méthode naturelle pour apprendre à connaître les différentes familles des plantes* (2 vols. 8vo, 1764, written with a phonetic orthography of his own invention). He also contributed many valuable memoirs to the publications of the academy of sciences.

ADAR, the name of the 6th month in the civil year of the Jews, and of the 12th in their ecclesiastical year, answering to parts of February and March. A fast for the death of Moses is observed on the 7th, the fast of Esther on the 13th, and on the 14th and 15th the feast of Purim. A second Adar is intercalated seven times in every nineteen years, in order to harmonize the lunar and solar periods.

ADDA (anc. *Addua*), a river of N. Italy, a tributary of the Po. It rises in the Rhætian Alps, flows S. W., S., and S. E. through the Valtellina and Lombardy, and the lakes of Como and Lecce, and enters the Po about 8 m. W. of Cremona. Its course is about 80 m. Lodi, the scene of one of Bonaparte's early triumphs, and Cassano, at which Moreau was defeated in 1799, are on its banks.

ADDER. See VIPER.

ADDINGTON, a S. county of the province of Ontario, Canada, bordering on the bay of Quinté, near the E. end of Lake Ontario; area about 2,000 sq. m.; pop. in 1871, 21,312. The county is about 122 m. long, and from 7 to 18 wide. It has between 20 and 30 lakes, the longest of which, Massanogo, is about 50 m. long. The northern townships are new and thinly settled. The chief occupations are agriculture and lumbering. Chief town, Bath.

ADDINGTON. I. Henry, Lord Sidmouth, an English statesman, born May 30, 1757, died Feb. 15, 1844. He was the son of Dr. Anthony Addington of Reading, known as the author of treatises on scurvy and on the mortality of beasts, and for his attempt in 1778 to establish a political alliance between the earl of Bute and the earl of Chatham, whose physician he was. This connection with Lord Chatham led to an intimacy between Henry Addington and the younger William Pitt, who induced him to enter parliament in 1784. He was called to the bar in the same year, but never practised. In 1789 he was elected speaker, and continued to support Pitt, but voted against him on the slave question, favoring a gradual emancipation. In 1801 Pitt resigned and Addington took his place as chancellor of the exchequer and first lord of the treasury, and formed a new ministry. He aided in forming the treaty of Amiens in 1802, the objectionable clauses in which were vigorously attacked by Windham and Grenville. But in 1803, when peace was considered dishonorable, he supported a war policy. The prince of Wales, afterward George IV., had a personal dislike to Addington, who was regarded as the chief of the special friends of George III., and the illness of the latter gave the prince opportunity to show his animosity. In 1804 Addington resigned, and the king created him a peer by the title of Viscount Sidmouth (Jan. 12, 1805), and appointed him president of the council, which office he resigned in July. After Pitt's death, Lord Sidmouth entered the ministry of Grenville and Fox (Feb., 1806, to March, 1807), first as lord privy seal and afterward as president of the council. In 1812 Lord Sidmouth was appointed secretary for the home department in Lord Liverpool's ministry. In 1822, on the death of Lord Castlereagh, he resigned his office, but at Lord Liverpool's request retained his seat in the cabinet two years longer. **II. Henry Unwin,** an English diplomatist, a relative of the preceding, born March 24, 1790, died in London, March 6, 1870. He entered the foreign office after leaving Winchester college, and was for upward of 30 years in the diplomatic service in various countries, including the United States, whither he was sent in 1822, and again in 1826. He was under-secretary of state from 1842 to 1854, when on his retirement he was made privy councillor.

ADDISON, a W. county of Vermont, bounded W. by Lake Champlain and drained by Otter creek and its tributaries, which afford excellent water power; area, 750 sq. m.; pop. in 1870, 23,484. Near the lake the surface is almost level, but it becomes rugged and mountainous toward the east. The soil is fertile. The productions in 1870 were 57,725 bushels of wheat, 144,257 of corn, 334,446 of oats, 28,211 of buckwheat, 317,043 of potatoes, 495,771 lbs. of wool, 201,855 of maple sugar, 1,723,437 of butter, 546,047 of cheese, and 114,298 tons of hay. The value of farms was $16,001,548, and of productions $3,055,768. The manufacture of cotton, wool, paper, &c., is carried on, and quarries of white and veined marbles are extensively worked. The Rutland and Burlington railroad runs through the county. Capital, Middlebury.

ADDISON, Joseph, an English author, born at Milston, Wiltshire, May 1, 1672, died in Holland house, Kensington, June 17, 1719. He was educated at the Charter House school and at Queen's and Magdalen colleges, Oxford, and was early noted for elegant scholarship, and particularly for his proficiency in Latin versification, which elicited the praise of Boileau. His own tastes would probably have led him to take orders, which his father, the Rev. Launcelot Addison, dean of Lichfield, urged him to do, or to follow an exclusively literary career. But the age was one of too earnest political warfare to permit a young man of talent to keep aloof from party strife, and Addison began to pay court to prominent statesmen in complimentary verses and other offerings to their vanity. He thus secured the friendship and patronage of Lords Somers and Halifax, the former of whom in 1699 obtained for him a travelling pension of £300, by means of which he was enabled to visit France, Germany, and Italy. The death of William III. having removed his friends from power, he lost his pension, was forced to become a travelling tutor, and in 1703 returned to England. In the succeeding year, at the suggestion of Lord Halifax, he commemorated the victory of Blenheim in an indifferent poem entitled "The Campaign," containing, however, one fine simile, which so pleased the lord treasurer Godolphin that he appointed Addison a commissioner of appeal of the excise. From this time until the close of his career, except during the tory administration of Oxford and Bolingbroke, he was scarcely ever without office of some kind. In 1705 he accompanied Halifax to Hanover as secretary of legation. In the succeeding year he was appointed under-secretary of state, and in 1709 secretary to the marquis of Wharton, the lord lieutenant of Ireland, although he remained in London during the greater part of his term of office. He also represented Lostwithiel in parliament from 1708 to 1710, and Malmesbury during the remainder of his life. His career as a legislator was not brilliant, his only attempt to address the house having proved a total failure through loss of self-possession.—Previous to his 37th year Addison's literary productions were few and fragmentary. A book of "Travels" which attracted little attention, the "Dialogues on Medals," some occasional poems and English versions from Virgil and Ovid, and his Latin verses comprised nearly all that he had given to the public. His reputation as a wit and man of letters was nevertheless very great in the London clubs and coffee houses, then the usual resorts of literary characters; and his sudden appearance in the "Tatler," started by his school friend Steele in 1709, and its successor the "Spectator," as the most brilliant essayist of his time, was by no means a surprise to his friends. Upon his contributions to the "Spectator" his fame now chiefly rests. Commenced on March 1, 1711, it was continued daily till December 6, 1712, when Steele retired and the publication ceased. A year and a half later it was recommenced by Addison, who for a considerable period was its sole contributor. Eighty papers were then added to the 555 already published, and the "Spectator" was finally discontinued on Dec. 20, 1714. Of the 635 essays included in both series, Addison was the author of 274, his contributions being generally identified by some letter in the name of the muse Clio appended to them. He also wrote occasionally for the "Guardian," a successor of the "Spectator." He found this style of composition singularly adapted to his talents and disposition; and in an age artificial and frivolous almost beyond precedent, his essays are natural, decent, and instructive, infused with a serene and cheerful philosophy, and often with an artless gayety, and written in a diction of almost faultless purity. His papers on Milton, on Sir Roger de Coverley and his friends, and that entitled "The Vision of Mirza," are to this day among the masterpieces of English literature. In the spring of 1713 was produced his tragedy of "Cato," the immediate success of which, owing to the political significance attached to it, to the zeal of friendship, and to the existent standard of dramatic taste, was far beyond its merits as an acting play. Pope wrote the prologue and Dr. Garth the epilogue, and it had a run of 35 nights, and was translated into various European languages. It is now remembered chiefly by the soliloquy of the hero and a few passages which have become standard quotations. The death of Queen Anne having restored his political friends to power, he again held office, first as secretary to the lords justices, then for a while as secretary to the lord lieutenant of Ireland, and in 1715 as one of the lords of trade. In 1716, being then in his 45th year, he married the countess of Warwick and took up his residence with her in Holland house. The union proved an unhappy one to Addison. The countess was proud and high-tempered, and made his home so uncomfortable that he was fain to take refuge at the clubs and taverns, where it is said he often drank immoderately. In 1717 he reached his highest political elevation, being made one of the principal secretaries of state. But his inability to grapple with details and to take rank as a parliamentary leader unfitted him for the office, and he resigned it in the following year. Thenceforth until his death he applied himself to the completion of a treatise on the evidences of Christianity which had been projected some years before. His principal writings in addition to those already mentioned were the "Drummer," a comedy, an opera entitled "Rosamond," and the "Freeholder," a sort of political "Spectator." Scattered among his essays are also several devotional poems, exalted in tone and felicitous in diction, which are still included in every considerable collection of sacred poetry. Addison was a man of integrity and sincere piety, and by his amiability, his pleasant humor, and his varied conversational powers greatly endeared himself to his friends. To those not intimate with him, a natural shyness of manner, which he was never able to shake off, made him seem cold and reserved. He has been accused of slighting and even of depreciating the merits of men of equal ability with himself. His treatment, when at the height of political power, of his old friend and literary coadjutor Steele, was not generous, and he incurred the resentment of Pope, who attacked him in some memorably bitter lines. But the uniform tendency of his writings precludes the idea that he was to any considerable degree insincere or unjust to his contemporaries.

ADEL. See ADAL.

ADELAAR, Adelaer, or **Adeler** (the Eagle), a surname given, on account of his gallantry, to CORT SIVERTSEN, born in Brevig, Norway, Dec. 16, 1622, died in Copenhagen, Nov. 5, 1675. He rose from the position of a common sailor, in which capacity he served from 1637 to 1642 in the Dutch navy, to the rank of admiral, first in the Venetian and afterward in the Danish service. During the wars of Venice against the Turks, Adelaar gave evidence of his daring spirit by fighting his way in 1654, with the ship to the command of which he had risen by his skill, through 67 Turkish galleys, sinking 15 of them with about 5,000 Turks on board, all of whom are said to have perished. For this exploit Venice conferred upon him the order of St. Mark, the title of lieutenant general of the admiralty, and a pension. In 1663, after returning for a short time to the Dutch navy, Adelaar accepted employment under the Danish government, and in 1675 became commander-in-chief of the fleet just about to act against Sweden. He died before it sailed.

ADELAIDE, a city and the capital of South Australia, about 6 m. from the E. shore of St. Vincent's gulf, and 515 m. N.W. of Melbourne; pop. (with Port Adelaide and Albert Town) about 30,000. It is divided by the river Torrens into N. and S. Adelaide, and surrounded by a semicircle of hills. The city was founded in 1836, and incorporated in 1842. It possesses several fine squares, streets, and churches, a chamber of commerce, an assay office, and a botanical garden with a conservatory. King William street is the central thoroughfare and Hindley street the chief business locality. It is united by railway with Port Adelaide, 6 m. N. W. of the city, through which passes most of the commerce of South Australia. There is a large export trade in cereals, wool, and minerals, especially copper. A considerable amount of gold obtained from the mines discovered in 1852 is assayed at Adelaide. The export of wool exceeds 7,000,000 pounds annually. The annual shipment of fine copper is nearly 100,000 cwt. Since 1862 the greater part of the ore has been smelted in the colony. Adelaide has flouring mills, breweries, machine shops, brass and iron founderies, and manufactories of tobacco, soap, candles, earthenware, leather, and barilla. The total value of South Australian imports (including £93,392 bullion and specie) in 1869 was £2,754,770; of exports, £2,993,035; total tonnage of vessels, exclusive of coastwise, nearly 350,000. Most of this trade centres in Port Adelaide. Albert Town is a small village about 1 m. from the port. The public revenue of the city in 1869 was £773,351, and the expenditure £653,107. It is the seat of an Anglican and a Roman Catholic bishop.

ADELAIDE, Eugénie Louise, princess of Orleans, daughter of Louis Philippe Joseph, duke of Orleans, surnamed Égalité, born in Paris, Aug. 25, 1777, died there, Dec. 31, 1847. In 1791 she went to England. On her return, in November, 1792, she found herself proscribed as an *émigrée*, and fled into the Austrian Netherlands, then invaded by the French army of the north, putting herself under the protection of her brother, the young duke of Chartres, afterward King Louis Philippe, who commanded a division of that army. Her brother being soon compelled to take flight himself to escape the guillotine, she was conducted over to the Austrian advanced posts. She rejoined her brother after many perils in Schaffhausen, Switzerland, May 26, 1793, accompanied by her former governess, Mme. de Genlis. They next took refuge in a convent, but their money ran short, and she threw herself upon the protection of her aunt, the princess Conti, at Fribourg. Her aunt dared not receive her in her own house, as the prejudice against the name of Orleans was so strong among the royal family of France, but she put her and Mme. de Genlis to board in a Swiss convent. After a separation of 10 years she saw her brother once more at Figueras in Spain; and after some further removals she at length rejoined him at Portsmouth, England, whence she followed him to Palermo, where in 1809 he married the daughter of the king of the Two Sicilies. From that time till the restoration she lived with him in Sicily. When Louis XVIII. had to quit France once more, she again followed her brother abroad. After the revolution of July, 1830, she persuaded him to accept the throne. Madame Adelaide, as she was now called, exercised considerable influence on the decisions of the king of the French, and was popularly regarded as his guardian angel. She died two months before his overthrow in February, 1848.

ADELAIDE, Saint, queen of Italy and empress of Germany, born in France in 933, died at

Seltz, Alsace, Dec. 16, 999. She was a daughter of Rudolph II., king of Burgundy, whose contest with King Hugo of Italy was peaceably ended by her marrying in 947 the latter's son, Lothaire II., after whose violent death in 950 she was imprisoned by his successor Berenger II. for declining to marry his deformed son Adalbert. She escaped to the castle of a relative and solicited the protection of Otho I., the Great, who, captivated by her beauty and character, married her in 951. She was crowned empress of the West in 962, and exerted much influence in Germany during a part of the reign of her son Otho II. and as regent during the minority of her grandson Otho III. She was called the "mother of kingdoms." The latter part of her life was consecrated to works of piety and charity at Seltz, where she founded a Benedictine monastery; and she is honored as a saint on Dec. 16. Her biography has been written by St. Odilon and others in Latin, French, and German, and by G. B. Semeria in Italian (*Vita politico-religiosa di Santa Adelaide, regina d'Italia ed imperatrice del sacro Romano imperio*, Turin, 1842).

ADELSBERG, a small market town of Carniola, Austria, on the Semmering railroad, midway between Laybach and Trieste, near a celebrated cavern, which has five main divisions. The first, called Neptune or Great Dome grotto, traversed for the length of 400 feet by the Poik river, and rich in stalactites, constitutes the old part of the cavern, which has been known for upward of 600 years. The entrance to the new parts of the cavern was accidentally discovered in 1816. This leads in the first instance to the second main division, called the emperor Ferdinand's chamber, with large corridors called the ball-room and the circus, where annual festivals take place, and that of Calvary, a mound formed by the ruined columns of rocks more than 200 feet high. The third main division consists of two basins of water called the dropping well and Tartarus. The fourth main division, the archduke John grotto, opens behind a curtain of transparent spar, and contains other shapes called Little Curtain and Gothic Hall. The fifth main division, the Francis Joseph and Elizabeth grotto, explored for the first time in 1857, discloses a range of chambers with brilliant and fantastic shapes, and a picturesque elevation called Little Calvary. About three miles from Adelsberg is the Black or Magdalen grotto, through which runs a river. Here was first discovered the *proteus anguinus*, an animal half fish, half lizard, and eyeless. The Poik cavern, a mile from the last-named grotto, is only accessible by the aid of a rope, and remarkable chiefly for the dashing of the river over the rocks.

ADELUNG. I. Johann Christoph, a German lexicographer, born at Spantekow, Pomerania, Aug. 8, 1732, died in Dresden, Sept. 10, 1806. He finished his studies at the university of Halle, and went to Leipsic, supporting himself by translations of valuable foreign works. His *Glossarium manuale ad Scriptores mediæ et infimæ Latinitatis* (Halle, 1772-'84) is his most important achievement in this department. His great work, for which he took Johnson's English dictionary as a pattern, is his *Grammatisch-kritisches Wörterbuch der hochdeutschen Mundart* (Leipsic, 1774-'86). He also produced *Deutsche Sprachlehre für Schulen* (Berlin, 1781), and *Umständliches Lehrgebäude der deutschen Sprache* (Berlin, 1782). In 1787 Adelung was called to Dresden, and appointed head librarian to the electoral library in that city, where he conceived the plan of his *Mithridates*, a work which was to contain an account of all the known languages of the earth, with a translation of the Lord's prayer given as a specimen of each. He only lived to finish the first volume, which gave an account of the Asiatic languages. The work was afterward taken up by Johann Severin Vater, and his own nephew Friedrich Adelung, and finished in 4 vols. It is said that he devoted 14 hours a day to study. **II. Friedrich von**, nephew of the preceding, born in Stettin, Feb. 25, 1768, died in St. Petersburg, Jan. 30, 1843. He began his career as a private tutor, and spent several years in Rome, but subsequently went to St. Petersburg, where he was appointed by the emperor Alexander preceptor of his brothers Nicholas (afterward czar) and Michael. His principal works are: "The Relations between the Sanscrit and Russian Languages" (1815), an "Essay on the Sanscrit Literature and Language" (1830), and *Bibliotheca Sanscrita* (1837).

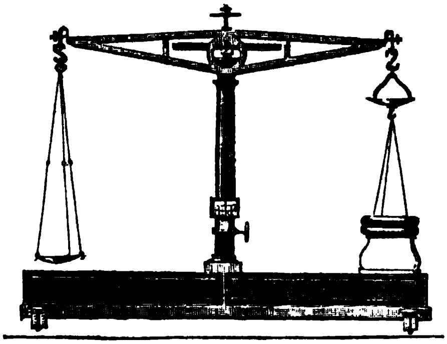
ADEN (anc. *Adane*, *Attanæ*, or *Arabia Felix*), a fortified British seaport town on the S. coast of Arabia and on the gulf of Aden, about 120 m. E. of the entrance to the Red sea at Bab-el-Mandeb, lat. 12° 47′ N., lon. 45° 9′ E.; pop. about 50,000. It is built on the N. E. end of the peninsula of Aden, and connected with the mainland by a low, sandy isthmus. The latter, united with another peninsula called Jebel Hassan, forms the two extensive harbors of Aden, the best on the Arabian coast. The town stands at the E. base of a volcanic mountain range from 1,000 to 1,800 feet high. It is a place of considerable strength and is well garrisoned, its situation between Asia and Africa resembling that of Gibraltar between Europe and Africa. The superiority of the port and abundant supply of water render Aden a valuable and important station on the way from India to Europe. The inhabitants are Asiatic and African, with a few Europeans, chiefly English. The English political resident is the governing authority. The town is surrounded with gardens and fruit trees. The climate, though dry and hot, is not insalubrious.—In ancient times, Aden was the great centre of trade between Arabia, Egypt, and India. It was destroyed by the Romans in the time of Augustus, but soon revived. Marco

Polo speaks of its wealth and splendor in the middle ages. At the beginning of the 16th century it was so strongly fortified that the Portuguese failed to capture it; but the Turkish domination, from about 1540 to 1630, was injurious; and the imam of Sana and the sultan of Yemen, who successively ruled Aden for the next three generations, completed the work of the Turks, and left the place a heap of ruins in 1705, when it became independent. In 1838 Capt. Haynes proposed to the sultan of Aden to cede the town to Great Britain, and on his declining the English took forcible possession, Jan. 11, 1839. Since that time the town has gained commercial importance. In 1870 the imports from Great Britain amounted to £110,403, and the exports to £2,633.

ADERNO (anc. *Adranum*), a town of Sicily, in the government and 17 m. N. W. of Catania; pop. in 1861, 12,877. It is situated on a plateau at the S. W. foot of Mt. Etna, and is approached by a steep winding road of 4 m. A large proportion of the inhabitants are monks and nuns. There are many remains of the ancient town and ruins of mediæval buildings; and in the piazza is a Norman castle, now used as a prison.

ADET, Pierre Auguste, a French chemist and politician, born at Nevers in 1763, died about 1832. He was sent by the directory in 1795 to the United States as minister plenipotentiary, and presented to congress a tricolor flag on behalf of the French nation. On Oct. 27, 1796, he delivered to the secretary of state the celebrated decree of the directory complaining that the American government, in its treaty with England, had violated its neutrality and broken the treaty of 1778, and authorizing French ships of war to treat neutral vessels in the same manner that they allowed themselves to be treated by the English. After the delivery of this note Adet announced that he should suspend his functions, and he accordingly returned to France, after issuing an inflammatory address to the people of the United States. He subsequently adhered to Napoleon, but his political career remained unimportant. He composed a new system of chemical signs, but it found no favor.

ADHESION (Lat. *ad*, to, and *hærere*, to stick), the force by which the particles of different bodies stick together, distinguished from cohesion, which is the force that holds the molecules of the same body together. There are six kinds of adhesion: solids to solids, liquids to solids, liquids to liquids, gases to solids, gases to liquids, and gases to gases. 1. *Solids to solids.* Two glass or metal plates with well ground surfaces, when pressed together, will adhere with such force that the upper one will not only support the lower, but an additional weight will be required to separate them. The amount of this adhesive force has been measured by recording the weights necessary for their separation. The records of the old experimenters on this subject are worthless, because they placed a lubricating fluid, oil or fat, between the plates; they found thus the cohesion of the oil or fat, and not the adhesion of the plates. . In later times Prechtl in Germany has made the most careful experiments in this line; he took polished metal plates of 1¼ inch diameter, suspended the upper one to a balance, brought it to an equilibrium in a horizontal position, and attached the lower plate to a support underneath it. Both plates were then brought in contact, so that the flat polished surfaces covered one another perfectly, and the weights required in the scale at the other end of the balance beam to separate the plates were the measures of the adhesion.



Prechtl's Adhesion Balance.

He found thus the following remarkable law: The adhesion between two plates of the same material is the same as that between one of the plates and any material which possesses a less adhesive force. For instance, to separate two copper plates required a weight of 21 grains; but the same weight was required to separate one of the copper plates from a plate of bismuth, zinc, tin, lead, &c., notwithstanding the adhesive force of bismuth to bismuth, zinc to zinc, &c., was found to be smaller than that of copper to copper. Prechtl found also that an attraction of the plates manifested itself at an appreciable distance before actual contact, and he even measured the amount of this attraction at the distance of $\frac{1}{24}$ of an inch by means of weights in fractions of grains. The suspended plate when brought within this distance was attracted with an accelerated motion till the contact took place with a slight concussion. The idea that the pressure of the air was the chief cause of the adhesion of two such plates, as it is in the case of the well known experiment with the Magdeburg hemispheres, was set at rest by Boyle, who suspended the adhesive plates charged with weight in the vacuum of an air pump; the plates were not separated, while the hemispheres held together by the vacuum alone fell apart. The adhesion of solids to solids is also seen in the dust, which will not only adhere to perpendicular but even to inverted surfaces. Granite consists of feldspar, quartz, and mica, kept together by adhesion. A portion of such apparently adhesive force is, however, cohesion. For instance, brick and mortar adhere chiefly by the cohesion of the mortar, which penetrates the pores of the brick; stones without sensible pores do not adhere so well to mortar. 2. *Liquids to solids.* Taylor was the first who investigated this subject in a scientific manner. He suspended a polished plate on the balance as above described, and brought it carefully down on the surface of a liquid, when it adhered, and the adhesion was measured by the weight required to separate the plate. After this method Guyton de Morveau in Paris found that plates of a French inch in diameter had the following adhesive power to mercury: gold, 446 grains; silver, 429; tin, 418; lead, 397; bismuth, 372; zinc, 204; copper, 142; antimony, 126; iron, 115; cobalt, 8; cold platinum, 108; red-hot platinum, 10 grains. Taylor also believed that the pressure of the air was the main cause, but Guyton found nearly the same results in the vacuum of the air pump. Link took a polished plate of agate of nearly one inch diameter, and tested its adhesion to different liquids; he found for water, 25 grains; sulphuric acid, 29; hydrochloric acid, 25; solution of saltpetre, 23; of lime, 21; almond oil, 16; petroleum, 16; turpentine and alcohol, 15; ether, 10. Where in many of these experiments drops of the liquid adhere to the plate used, it proves that the adhesion of the liquid to the solid is stronger than the cohesion of the liquid itself, and that the numbers obtained express rather the cohesion of particles of the liquid which were separated by the weight, than the adhesion of the plate to the liquid. The ascent of liquids in capillary tubes is also a result of adhesion, as well as the spreading out of liquids between two surfaces kept in close proximity. The chain pump, in which the water is carried up by a simple chain in a tube, is a practical application of adhesion. Prévost made interesting experiments on elective adhesion, showing how one fluid will drive another away from a surface for which it has more adhesion. He found that they displace one another in the following order: ether, alcohol, oil of bergamot, poppy oil, olive oil, nut oil, and other oils, water. Pure water displaces in its turn solutions of salts and alkaline earths. Camphor drives a film of water away from a surface, and pieces of camphor placed on water will show a peculiar motion; the same is seen with camphor or phosphorus placed on pure mercury. These phenomena are due to the evaporation of the solid and the cohesion of its vapor. We see practical applications of the adhesion of liquids to solids in writing, painting, printing, dyeing, washing, and elutriation, or separation of coarse from fine powders by suspension and settling in a large quantity of water. 3. *Liquids to liquids.* If a drop of water is placed on mercury, or a drop of oil placed on water, it does not keep its round form, but spreads out at once, because its adhesion to the liquid surface is greater than the cohesion of its particles. A drop of water on an oily surface, however, will not spread out, as the cohesion of its particles is greater than its adhesion to the oil. The manner of displacement of one liquid by another having greater adhesive force to the liquid they float on, gives rise to a series of phenomena, for the study and exhibition of which Prof. Morton of the Stevens institute at Hoboken has recently contrived an apparatus in the style of a magic lantern. 4. *Gases to solids.* Many solids have the property of condensing gases on their surface (see ABSORPTION OF GASES), and polished metallic surfaces, even when long exposed to the air, will be covered with such a gaseous film, which is the first manifestation of chemical affinity. In the process of daguerreotyping, the polished silver plate will be inert unless this film of air has been removed by a polishing process just before the operation. Such removal of air may be made visible on the surface of a glass mirror which has not been rubbed for some time, by drawing a few figures or letters on it with a clean finger; the invisible change of surface will become visible by breathing on the glass, when the appearance of the deposit of watery vapor will show where the air film has been removed by friction. The adhesion of gases to solids is further illustrated by the small air bubbles which are often visible in mineral waters and effervescent drinks, sticking to the sides of the glass vessel in which they are contained, and not rising to the surface notwithstanding they are some 600 times lighter than the liquid. This adhesion is also illustrated by heavy powders and even sewing needles floating on water; the air adhering around the needle prevents the adhesion of the water, and the latter by its own cohesion forms a hollow depression in which the needle floats. The same adhesion of air around a piece of solid iron causes it to float on melted iron, notwithstanding it has not a less specific gravity than the fluid material. The mutual adhesion of solids and gases is also illustrated by the floating of particles of dust in the air; subdivision of matter increasing the surface, a continued subdivision will at last cause a point to be reached where the surface adhesion overcomes gravitation. In the vacuum of the air pump the dust falls down like a heavy body. It is the same with smoke, as this consists of solid particles carried upward by a current of heated air; the white smoke evolved by the burning of magnesium, zinc, or phosphorus illustrates this point very plainly. 5. *Gases to liquids.* The adhesion of gases to the surface of liquids is stronger in proportion to their solubility or absorption by the liquid. So carbonic acid adheres to water with greater force than air; but air possesses very strong adhesion to water, as shown by the currents of air carried down by any considerable cataract. Use is made of this adhesion in the so-called water bellows, in which a stream of water falling through a wide tube carries air downward and produces a blast so strong that this principle was used for driving the drills during the boring of the Mont

Cenis tunnel. In the so-called atomizer a current of air is used to divide water into a fine spray. In the Giffard injector a blast of steam is used to carry water by its adhesion to it into the boiler against its own pressure. The adhesion of air to water is further illustrated by the friction of a strong wind on its surface, which not only pushes it forward, but creates the waves. If oil is spread over the water, the air finds a surface for which it has little adhesion, and glides easily over it. This is the cause of the quieting influence of oil upon ocean waves, of which advantage has occasionally been taken in a storm by vessels having oil on board; the oil will spread at once over a large surface. The peculiar motions of camphor on water, phosphorus on mercury, &c., belong to the same class of phenomena; it is the elective affinity of the vapors of these volatile substances for the liquid on which they float, which is the cause of a strong and unequal evaporation at the points in contact, the evolving gas or vapor pushing the floating solid onward by its mechanical reaction. When the water is touched with a substance containing the merest trace of oil or grease, the motion of the camphor stops at once, as the water becomes then at once covered with a very thin but strongly adhering oil film, which has no affinity for the vapor of the camphor. A similar action is seen as soon as mercury is covered with a film of phosphorus; removing this film with the edge of a knife, the motion recommences at once, and is visible in the dark. The mutual adhesion of liquids and gases is also illustrated by the floating of watery particles in the atmosphere, as is seen in clouds and fogs. Watery vapor, present in the air in an invisible condition, becomes visible as soon as condensation commences, when a kind of fine water dust is formed, identical with the spray of large cataracts, where it originates by mechanical means. These watery particles are kept floating simply by their adhesion to the air, the total surface being very large compared with the total weight; but when the particles, by contact and mutual adhesion, form larger bodies, the total surface diminishes in proportion to the weight, while finally their gravitation becomes greater than their adhesion, and they fall down like rain. This falling down of water dust not only takes place in a vacuum, but even a trifling diminution in the atmospheric pressure will cause it when the amount of watery vapor in the air is large, as seen in the fact that rain is usually preceded by a descent of the mercurial column of the barometer. A descent of temperature is also a cause of this condensation of watery vapor, as it diminishes the capacity of the air for holding it. This adhesion theory makes the hypothesis of De Saussure quite unnecessary. This savant imagined that the particles of watery vapor were supported in the clouds by being hollow, with a vacuum inside, and thus, being lighter than the same volume of air, they were supported like a balloon. He was strengthened in this notion by the microscopic illusion which often causes solid small spheres to appear as if hollow. Still such hollow spheres are occasionally seen like microscopic soap bubbles, but they have air inside, are heavier than the air, and are only supported by adhesion. 6. *Gases to gases.* The interpenetration of gases being very great, it is impossible to keep their surfaces distinct; there must consequently be much adhesion and friction between them. Direct experiment with two gases cannot well be made, but observation demonstrates this great adhesion and friction. So one small jet of air in a wide tube will cause a rush of air to follow; the exhaust steam blown upward in the locomotive flue causes the air to rush out with it, and so creates the draft necessary to keep up a sufficient heat. This adhesion of gases plays no doubt a most important part in the actions of the atmosphere in the economy of nature.

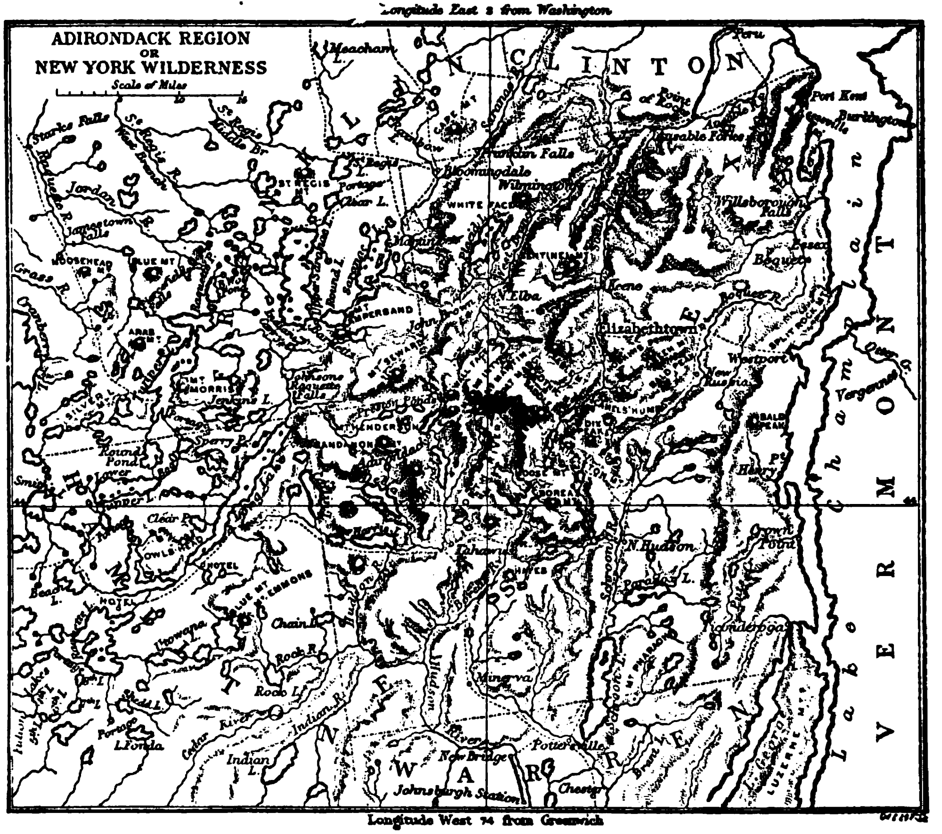
ADIGE (anc. *Athesis;* Ger. *Etsch*), a river of the Tyrol and N. Italy, rises in the Swiss Alps, and flows E., S., S. E., and again E. about 220 m. to the Adriatic, S. of Chioggia. On its banks are the towns of Trent and Roveredo in the Tyrol, and the fortresses of Verona and Legnago in Venetia.

ADIPOCERE (Lat. *adeps*, fat, and *cera*, wax, from its fatty origin and waxy consistency), a white, solid, non-putrescible substance, into which human bodies are sometimes converted after burial. If the dead body be left exposed to the air at a moderate temperature, it undergoes the process of putrefaction, and is rapidly decomposed with the evolution of offensive and putrefactive gases. If buried in closed coffins with a limited supply of air, or in a tolerably dry soil, the process is somewhat modified; the putrescent character of the changes is less marked, the offensive effluvia are much less abundantly developed or are absorbed by the soil, and the body slowly decomposes, losing its original form and structure, and finally crumbling away to powder, leaving only the bones, which remain for a long time after the remainder of the body has become unrecognizable. But occasionally it has been found that bodies disinterred after the lapse of many years have not undergone either of these changes, but on the contrary have been converted into a white, solid, and very heavy substance, of firm consistency, retaining the original size and contour of the frame, so that the features may still be distinguishable, and even the natural markings and texture of the skin distinctly apparent. This substance is adipocere. It does not putrefy, but has evidently remained unchanged for a long time while buried, and after disinterment continues with but slight alteration. After exposure to the air it simply becomes lighter in weight, drier and more granular, owing to the evaporation of the water which it contained; so that a body which has undergone this conversion may be afterward preserved for an indefinite time without changing materially in form or appearance. It is this change, or conversion of the soft parts into adipocere, which gives rise to the instances occasionally reported of human bodies being found after some years in a state of so-called petrifaction. The white color, solidity, and weight of the bodies thus found naturally suggest to the popular mind the idea of their having become petrified; but the change which they have undergone is in reality a very different one, and has little or nothing in common with a true petrifaction.—It is found that, for a body to become changed into adipocere, two principal conditions are mainly requisite. First, the body at the time of its burial must be fat. Lean bodies, as a rule, do not undergo the change in question, but only those which are abundantly supplied with adipose tissue. And yet it is not the adipose tissue itself which is converted into adipocere; it merely supplies some of the necessary elements, which are employed in effecting the alteration in other tissues. The second necessary condition is that the body should be buried in a moist place, and one in which the water collects in considerable quantity and remains standing at or about the level of the coffin, without being rapidly changed. Thus a single body, buried in marshy ground, or even deposited in a tomb which is undrained and collects standing water, will sometimes be found to have undergone the alteration. A collection of many bodies in or near the same spot seems also to favor the change. The first notable instance in which it was observed was on the removal in 1787 of the bodies deposited in the *Cimetière des Innocents* in Paris, where they had been accumulating for eight or nine centuries, many of them being found in the condition of adipocere. In 1849, in the city of New York, an old potter's field burying ground, situated at the junction of Forty-ninth street and Fourth avenue, was demolished and the bodies removed. Many of them had been buried in trenches or pits, in which the coffins were piled one upon the other, sometimes six or seven deep. This was said to have been done during the cholera epidemic of 1832. On removal of the bodies, those occupying the upper and middle tiers were found to be nearly or altogether decomposed; those forming the one or two lowermost tiers, beneath the level of the water retained by the soil, had apparently been converted into adipocere, but had been subsequently in great part dissolved and disintegrated by the water; while those situated between the two were in many instances also converted into adipocere, but completely preserved, retaining, with but a few changes, their natural form and size.—The process of the conversion of a human body into adipocere under such circumstances appears to be the following: The fatty substance of the adipose tissue first undergoes a change, by which it becomes rancid and produces two fatty acids, the oleic and the margaric acids. These acids are liquid, and, being in large quantity, penetrate the neighboring tissues, so that the skin, muscles, &c., become permeated and saturated with them. At the same time, the albuminous matter of these tissues, beginning to undergo decomposition, produces a small quantity of ammonia, which unites with the fatty acids, making an ammoniacal soap. The greater part of these acids, however, is taken up by combinations of lime, forming an oleate or margarate of lime, substances comparatively insoluble and non-putrescible. The lime is derived partly from the soil, being brought down in solution by the rain water as it filters through successive layers of superincumbent earth. If other bodies are piled above, the water which filters through also brings the products of their decomposition and partial solution, among which are ammonia and lime, until the whole of the fatty acids of the bodies lying at the requisite level have combined with these bases, and have become in this way converted into adipocere. Thus the tissues, already permeated by the fatty acids, are now saturated with their ammoniacal and calcareous combinations, and especially with the oleate and margarate of lime, which protects them from further decomposition, and causes even their minute anatomical structure to be indefinitely preserved. These bodies when first taken out are, as we have said, dense and heavy, owing to the abundant moisture which they contain; but this soon evaporates after exposure to the air, leaving them comparatively light and dry.—It is not by any means all the tissues and organs of the body which are converted into adipocere, even under favorable circumstances. The adipose tissue itself disappears more or less completely, since its principal ingredient is used up in accomplishing the alteration of other parts. The internal organs generally, such as the heart, lungs, brain, liver, spleen, kidneys, &c., become shrivelled and disintegrated and finally undistinguishable. But the skin, fascia, tendons, fibrous membranes generally, and especially the muscles of the head, limbs, and trunk, are all more or less completely preserved. The muscular texture is easily recognizable by the naked eye, and the natural folds of the skin, or accidental impressions made upon the surface by portions of the dress or ligatures, may be plainly discernible after the lapse of many years. The bones, teeth, hair, and other less destructible parts of the body, do not seem to be particularly influenced by the change, but undergo only the usual very slow and almost imperceptible alterations which they would present in ordinary cases.

ADIPOSE SUBSTANCES (Lat. *adeps*, fat), a class of substances of a fatty nature, which are present in greater or smaller quantity in most animal and vegetable organisms. Adipose substances are all composed of carbon, hydrogen, and oxygen, to the exclusion of other chemical elements. They are all crystallizable at a low temperature and fluid at a high temperature, combustible, and insoluble in water, but soluble in ether and in each other. They differ from each other in the exact proportion of the different chemical elements which they contain, and particularly in the precise degree of temperature at which they crystallize or assume the solid form; some of them, such as stearine when pure, remaining solid above 140° F., while others, such as oleine, continue fluid until near the freezing point of water. The three special kinds of adipose substance with which we are most familiar are stearine, margarine, and oleine; stearine and margarine being the principal constituents of the more solid fats, while oleine is abundant in the more fluid fats, or oils. In the animal body, these different substances are usually mingled with each other in various proportions, thus forming fats or oleaginous ingredients of different degrees of consistency. They are found in the adipose tissue, of which they form by far the largest part; in the minute cells of the liver and of some cartilages, where they are deposited in the form of microscopic globules; in the brain and nervous matter, where they are found in the proportion of from 5 to 15 per cent.; in the marrow of the bones; in the chyle, to which fluid they impart its opacity and white milky color; and in the milk itself they exist under the form of the milk globules, which are minute particles of butter, formed of a mixture of various fatty substances, and suspended in the serous fluids of the secretion. There is also a sebaceous matter secreted by the skin, especially in the parts covered with hair, which is a semi-solid or lardaceous secretion, consisting largely of adipose materials. Fatty substances also exist in considerable abundance in the food, since they enter so largely into the composition of animal and vegetable tissues. The fat of meat, the liver and the brain of animals, when used as food, of course supply a large quantity of adipose substances. Milk and butter and the yolk of eggs are especially rich in these materials; and many articles of vegetable food, such as nuts, olives, Indian corn, &c., also contain them in large proportion.—Although fatty substances by themselves are not capable of sustaining life when used exclusively as articles of food, yet they are extremely useful and perhaps indispensable as part of the regimen. This is shown by the instinctive desire, which is nearly universal among healthy persons, to have some kinds of adipose materials as a portion of the food; butter, fat, and olive oil being the kinds most highly valued and abundantly used. It has also been proved directly by the experiments on the fattening of animals by Boussingault (*Chimie agricole*), who found that, however abundant and appropriate the other elements of the food might be, the addition of a small quantity of fatty substance improved greatly the condition of the animals, and caused the formation in their own bodies of a much larger amount of fat than that which had been introduced. Thus the fat which exists in the interior of the body of a living animal has not all been derived from similar materials taken with the food. On the contrary, there is every reason to believe that fatty substances are produced in some way, in the process of digestion and assimilation, from the starchy and saccharine elements of the food. It is a matter of common observation that food containing an abundance of starch and sugar is especially favorable to the deposit of fat; and Boussingault also found that the most effective diet for the fattening of pigs was one consisting very largely of cooked starchy materials, with the addition of a small proportion of fatty substances. The adipose substances found in the body are thus partly introduced with the food, and partly generated from the transformation of its starchy and saccharine ingredients. They are then deposited in the various tissues, or form for the time a part of the fluids or secretions, like the chyle, the milk, and the sebaceous matter of the skin. Of all the fatty material thus taken with the food, or generated in the system, but a small part is again discharged in its own form. It is only the fat of the sebaceous matter and that of the milk which is thus discharged. The remainder is decomposed or transformed in some way in the daily process of nutrition, so that it is no longer recognizable as fat. In the opinion of some writers, it is directly oxidized by the air taken in by respiration; thus producing animal heat and the evolution of carbonic acid, as it would do if burned, as in the case of ordinary combustion. But this must be considered as doubtful, since we cannot yet follow all the details of the chemical changes which take place in the living body. It is certain, however, that the fat which is taken up from the intestine during the digestion of food is absorbed by the vessels, partly deposited in the adipose and other solid tissues, and for the most part rapidly decomposed or transformed, so that it disappears and is used up, so to speak, in the nutrition of the body.

ADIPOSE TISSUE, the tissue in animal bodies containing the largest proportion of adipose substance, known in ordinary language as the fat of the animal, in distinction from the lean or muscular flesh. The adipose tissue is situated principally beneath the skin and over the muscles, particularly those of the abdomen, about the cheeks, in the orbit of the eye, over the buttocks, on the outside of the heart about the origin of the great vessels, over the intestines, where it forms a special layer or distinct curtain called the *omentum*, around the kidneys, and in various places about the inner side of the abdominal walls. It consists of a number of distinct masses or lobules, which are connected with each other by thin layers of areolar tissue, containing the few blood vessels and nerves with which the adipose tissue is supplied. Each lobule in its turn consists of a number of transparent vesicles, or closed sacs, about $\frac{1}{500}$ of an inch in diameter, which are peculiar to the tissue and are called the adipose vesicles. Each vesicle consists of a thin, colorless, and structureless animal membrane, embracing a closed cavity, and filled with fluid or semi-fluid fat. The vesicles generally approximate a globular or ovoid form, but with some flattening and angularity of surface produced by mutual compression. The albuminoid elements entering into the composition of the adipose tissue, such as those composing the wall of the vesicles, the intermediate areolar tissue, &c., are much less abundant than its fatty contents. The blood vessels and nerves are particularly scanty, as compared with those of the neighboring skin and muscles; so that a wound of the adipose tissue produces but slight pain and very little bleeding.—The functions of the adipose tissue are for the most part physical in their character. It acts as a cushion to protect delicate parts from pressure or injury. Particularly, wherever the skin is exposed to frequent pressure over a bony prominence, as over the buttocks or beneath the heel, it is defended by an elastic layer of fat. The eyeball rests in its socket upon such a cushion of adipose tissue, and the abdominal organs are protected from injurious pressure by that of the omentum and the abdominal walls. The entire layer of adipose tissue beneath the skin and elsewhere also acts as a protection to the animal warmth. Being to a great extent a non-conductor, it is a kind of natural blanket, which prevents the dissipation of the heat of the internal organs, and thus serves to maintain their temperature. An abundant layer of adipose tissue is accordingly an effective protection against external cold, while animals which are in an emaciated condition more readily suffer from its effects.—Adipose tissue is sometimes deposited in an excessive degree, forming morbid growths or tumors. These tumors, however, are usually not dangerous, but only inconvenient from their size or situation.

ADIRONDACK MOUNTAINS, the principal group of mountains in New York, extending from the extreme N. E. corner of the state in a S. S. W. direction toward its centre, occupying portions of Clinton, Essex, Franklin, and Hamilton counties. The Catskills, S. of the Mohawk river, may be regarded as their extension in this direction. In the western part of Essex county these mountains have their greatest development, and present the highest peaks of any of the northern spurs of the Appalachian chain, Mount Washington in New Hampshire alone excepted. They rise from an elevated plateau, which extends over this portion of the country for 150 miles in latitude and



100 in longitude, and is itself nearly 2,000 feet above the level of the sea. The highest summits are those of Mounts Marcy, St. Anthony, McMartin, Seward, Emmons, and McIntyre. The first of these reaches the height of 5,337 feet above the level of the sea. St. Anthony, McMartin, and Seward are supposed to be about 5,000 feet high, and the other two summits about 4,000 feet each. These mountains are in ranges, which have a general N. N. E. and S. S. W. direction; but being formed not of stratified, but of granitic rocks, they lack that precision of outline which characterizes the mountains of the same Appalachian system in the middle and southern states. For the same reason the peaks assume more of the conical form, the slopes of the mountains are more abrupt, and the scenery wilder and grander than among the mountains of the sedimentary rocks. The Saranac and the Ausable, whose sources are among these mountains, run in nearly parallel lines toward the northeast, discharging their waters into Lake Champlain. They define upon the map the position of the valleys, which have the same general arrangement throughout the whole chain, and to some extent the position of the ranges of mountains also. In the other direction, the Boreas, the Hudson, and the Cedar rivers, which all unite below into the Hudson, define the extension of the valleys of the Ausable and its branches on the S. declivity of the great plateau; and further west the chain of lakes, including Long lake, Raquette lake, and the Fulton lakes, lie in the same line with the valley of the Saranac, and mark its extension from the central elevation of the plateau toward the southwest. The drainage of this table land is toward Lake Champlain on the east, the St. Lawrence on the northwest, and the Hudson on the south. The sources of many of the streams which flow in these different directions often interlock with each other; and the numerous lakes and ponds with which they connect lie almost upon the same horizontal plane. The elevations of many of these sheets of water are given by Prof. Benedict, and nearly all of them are included between 1,500 and 1,731 feet above the level of the sea, the latter being the elevation of Raquette lake. The great numbers of these lakes and rivers easily navigable to the light canoe of the Indian, with occasional portages past the rapids and falls, gave to this district in former times features of great interest. The deer, moose, caribou, bear, beaver, and otter were abundant throughout this region, and, with the numerous varieties of fish, among them the salmon trout and the pike, of those excellent qualities only met with in our northern inland waters, gave to that ancient race nearly all they required for sustenance. The game, excepting the caribou, still linger about the Adirondacks. The mountains are covered with forests, groves of birch, beech, maple, and ash succeeding to the evergreens, among which the most common are the hemlock, spruce, fir, and cedar, with the valuable white pine intermixed with and overtopping the rest. In the lower lands along the streams a denser growth of the evergreens is more common, forming almost impenetrable swamps of cedar, tamarack or hackmatack, and hemlock. The white pine is the most valuable product of this region; and the numerous rivers, which served as roads for reaching every part of it, now answer the same purpose

The Adirondacks from Placid Lake.

for conveying this valuable timber to market. So important has the pine upon these mountains become, that large sums have been expended in removing the obstructions of the streams, and in opening new outlets to the lakes, by which in the spring freshets the logs could be run down. As may well be supposed, this mountain region offers little inducement to the permanent settler. Only along the wider bottoms of the Saranac and the Ausable, the fertile alluvial soil, the wash of the mountains, tempts to cultivation.—About 40 years ago the discovery of enormous masses of magnetic iron ore in the very heart of the mountains led to the establishment of the village of Adirondack, in the township of Macomb, on the western border of Essex county, about 50 m. W. of Lake Champlain. Iron works were erected on a scale of considerable magnitude; but the final result was that the distance from market, the scarcity of labor, and the difficulties of transportation made the enterprise unprofitable in spite of the excellence and abundance of the iron, and the works are now wholly abandoned.—Of late years the whole northern wilderness of New York has come to be popularly known as the Adirondacks, and is much resorted to, not only by sportsmen, but by tourists of both sexes, for whose accommodation taverns have been established at convenient distances. All travelling there is done by means of boats of small size and slight build, rowed by a single guide, and made so light that the craft can be lifted from the water and carried on the guide's shoulders from pond to pond or from stream to stream. Competent guides, steady, intelligent, and experienced men, can be hired at all the taverns, who will provide boats, tents, and everything requisite for a trip. Each traveller should have a guide and a boat to himself, and the cost of their maintenance in the woods is not more than a dollar a week for each man of the party. The fare is chiefly trout and venison, of which there is generally an abundance to be procured. A good-sized valise or carpet-bag will hold all the clothes that one person needs for a two months' trip. There are several routes by which the Adirondacks can be reached, but the best and easiest from New York is that by Lake Champlain. The steamer from Whitehall will land the traveller at Port Kent, nearly opposite Burlington, Vt., where coaches are always waiting to take passengers, six miles, to Keeseville. Here conveyances for the wilderness can always be had.

ADIT (Lat. *aditus*, entrance), a horizontal passage made into mines for the purpose of draining them, and also for the extraction of their products at the lowest convenient level. In very mountainous regions adits often present the readiest means of access to the mineral veins known to exist in the interior of precipitous hills. Enormous sums have been expended in the silver region of Mexico in these exploring adits. One of the most famous adits in the world is that of Klausthal, in the Hartz, which is 6¼ miles long, and passes upward of 300 yards below the church of Klausthal. Its excavation lasted from the year 1777 till 1800, and cost about $330,000. The adit which drains the district of Gwenap, in Cornwall, is estimated with its branches to extend a distance of 30 miles; its mouth is in a valley near the sea, and from it are discharged the superficial waters of numerous mines, as also all the water pumped up in them to its level. One of the most extensive adits in the world was commenced in the beginning of the present century by the Austrian government, and is called by the name of Joseph II. Its mouth is in the banks of the river Gran, in Hungary, and it passes by the mines of Hodritz toward those of Schemnitz, about 10 miles. The object of its construction is partly to explore for new veins, and in part to drain mines already in operation. A work of similar magnitude has been undertaken in the Washoe mining district of Nevada, for the purpose of developing the Comstock lode. It is known as the Sutro tunnel, and the plan was to commence at the Carson river, 150 feet above the stream, and to excavate a space of 12 by 14 feet to a distance of 19,790 feet, when the lode would be cut at a depth of 1,898 feet below the outcrop. A cross tunnel was to be constructed along the ledge about 12,000 feet, to connect with all the mines, and four shafts were to be sunk for ventilation. A company for its construction received large privileges from congress in 1866, and afterward application was made for a government subsidy. A commission was appointed to examine the project, which early in 1872 reported unfavorably, estimating the cost at $4,418,329. The work was not then far advanced, but has since been vigorously prosecuted both upon the main tunnel and the shafts.

ADJUTANT, a staff officer attached to the commander or to the headquarters of larger or smaller bodies of troops. Generally, the commander of every military post, battalion, regiment, brigade, division, corps, army, or military department has an adjutant, or an adjutant general, with such assistants as the importance of the command may require. The duty of the adjutant is to assist his chief in the performance of his military duties, to make known his orders, to see to their execution, to receive reports, and to take care of the records and returns pertaining to the troops. He has therefore under his charge, to a great extent, the internal economy of the command to which he is attached. By authority of the commander, he regulates the rotation of duty among its component parts, and gives out the daily orders; at the same time, he is a sort of clerk to his chief, carries on the correspondence with detachments and with the superior authorities, arranges the daily reports and returns into tabular form, and keeps the journal and statistical books of his body of troops. Larger bodies of troops now generally have a regular staff attached, taken from the general staff of the army, and under a "chief of the staff," who takes to himself the higher functions of adjutant, and leaves him merely the transmission of orders and the regulation of the internal routine duty of the corps. Owing to the difference of regulations and military systems, as well as to the peculiarities of commanders, there is practically a great variety in the functions of adjutants. In the army of the United States there is one adjutant, or adjutant general, attached to the war department, who issues the orders of the secretary of war and the general-in-chief, and has charge of the military record of the government. He is also head of the adjutant general's department, composed of a fixed number of colonels, lieutenant colonels, and majors, promoted by selection from the officers of the army, and assigned to duty in the bureaus of the adjutant general's office or with the headquarters of armies, corps, divisions, brigades, or military divisions and departments; they are called assistant adjutants general. Besides these, the governor of each state has an adjutant general, while the requirements of monarchical institutions have created in almost all European states hosts of titular adjutants general to the monarch, whose functions are imaginary, except when called upon to do duty with their master; and even then these functions are of a purely formal kind.

ADJUTANT BIRD. See MARABOU.

ADLERBERG. I. Vladimir Federovitch, count, a Russian statesman, born in St. Petersburg in 1793. His mother, the widow of a colonel, and superior of a seminary for the daughters of the nobility, was much befriended by the empress Maria Feodorovna, through whose influence the son became a favorite at court, and in 1817 adjutant to the grand duke Nicholas. After the latter's accession to the throne, Adlerberg became his constant companion, and was made general of infantry in 1843 and count in 1847. In 1852 he was appointed minister of the court, the most influential office in the personal service of the imperial family, and which requires constant attendance on the emperor. After the death of Nicholas (1855), and at that emperor's urgent recommendation, he retained his post under Alexander II., whose full confidence he also enjoyed. In 1869 he retired on account of old age. For many years he had also officiated as postmaster general, and contributed much toward postal reform. His sister, widow of the councillor of state Baranoff, brought up the daughters of the emperor Nicholas, and was made a countess in 1846. **II. Adlerberg II., Alexander,** count, eldest son of the preceding, succeeded him in 1869 as minister of the court and chancellor of imperial decorations, and holds the rank of general of infantry and chief aide-de-camp of the czar. He is inseparable from the emperor, of whom he had been a schoolmate, and whom he accompanied on his journey to Germany and the Caucasus in 1871. **III. Adlerberg III., Nicholas,** brother of the preceding, was active in the Hungarian campaign of 1849, published in 1852 a narrative of his journey to the Holy Land (*Ot Rima v' Yerusalem*, "From Rome to Jerusalem"), was governor of the province of Taurida in 1854-'5, and from 1857 was for some time military commissioner in connection with the Russian embassy at Berlin. He holds the rank of adjutant general of the emperor, and since 1861 also that of lieutenant general. He has been for several years governor general of Finland.

ADLERCREUTZ, Karl Johan, count, a Swedish soldier, born April 27, 1757, died Aug. 21, 1815. He distinguished himself in the Finnish war against Russia in 1808, as adjutant general of Field Marshal Klingsporr, and on March 13, 1809, joined that officer in arresting Gustavus IV. in his own palace. The king was deposed, and the diet on May 1 thanked Adlercreutz and his fellow conspirators for having saved Sweden from ruin by their daring. He was made lieutenant general in 1809 and count in 1814.

ADLERSPARRE. I. Georg, count, a Swedish soldier and statesman, born March 28, 1760, died Sept. 23, 1835. He enjoyed the confidence of Gustavus III., after whose death (1792) he retired from the army, and edited from 1797 to 1801 a periodical, *Läsning i blandade Ämnen*, the liberal politics of which gave umbrage to the government. In 1809 he joined in the campaign against Russia, as well as in the conspiracy which culminated on March 13 in the arrest and deposition of Gustavus IV. He had insisted upon the consummation of this event without bloodshed and revolutionary commotion. On May 1, 1809, he received the public thanks of the diet, and was promoted to various high dignities, eventually including that of count and provincial governor general, which latter post he resigned in 1824. He was fined in 1831 for having published secret state papers and his private personal correspondence with Swedish princes, but protested against the injustice of the punishment and persisted in the publication (*Handlingar rörande Sveriges äldre och nyare historia*, 9 vols., Stockholm, 1830–'33). **II. Karl August,** count, an author, eldest son of the preceding, born in 1810, died in 1862. Like his father, he possessed poetical talent, and published various novels and lyrical effusions under the name of Albano. His reputation rests on his historical works, entitled *1809 Års Revolution*, and *1809 och 1810 Tidstaflor* (respectively 2 and 3 vols., Stockholm, 1849), and *Anteckningar om bortgångna Samtida* (3 vols., 1860–'62).

ADMETUS, in Greek mythology, a king of Pheræ, in Thessaly, who took part in the Calydonian hunt and the Argonautic expedition. He is said to have obtained, through the intercession of Apollo, deliverance from death, on condition that his father, mother, or wife should voluntarily die for him. This was cheerfully complied with by his wife Alcestis, daughter of Pelias, who was subsequently rescued from the hands of Pluto by Hercules and restored to Admetus.

ADMINISTRATOR. See EXECUTOR.

ADMIRAL, a naval officer of the highest rank. The title was introduced by the Genoese and other Italians into Europe, and was probably derived from the Arabic word *amir*, which was also used in reference to shipping by the Greeks of the lower empire. The office of admiral was not created for the navy of the United States until during the second year of the civil war. Previously the grade of captain was the highest in the service, although the title of commodore had been accorded to commanders of squadrons and naval stations, and they had assumed the commodore's distinguishing broad pennant. By act of congress, Jan. 16, 1857, captains in command of squadrons were denominated flag officers, and by subsequent and progressive departmental orders and regulations they substituted for the broad pennant a square blue flag worn at the mizzen; next the same at the fore for those over 20 years commissioned as captain, and the senior captain's was carried at the main; finally they came to arrogate all of the functions of admirals. Congress established the grade of rear admiral July 16, 1862, and commissioned therein on account of eminent individual services David G. Farragut and three other captains from the active list, and Charles Stewart and ten other distinguished veterans from the retired list. The grade of vice admiral was constituted by act of Dec. 21, 1864, and Farragut promoted thereto as a reward for Mobile; and as a further token of gratitude and honor the grade of admiral was created for him July 25, 1866. The rank of admiral is relatively equivalent to that of general in the army, vice admiral to lieutenant general, and rear admiral to major general. The pay per annum of admiral is $13,000; the sea pay of vice admiral $9,000, and of rear admiral $6,000. There have been bestowed 2 commissions of admiral, 3 of vice admiral, and 55 of rear admiral; and there are now in the service 1 admiral, 1 vice admiral, and 38 rear admirals; of the latter, 12 are on the active and 26 on the retired list.—In Great Britain there were until 1864 three classes of admirals, red, white, and blue. The distinction of flags was then abolished, and only the white flag retained in the royal navy. The management and superintendence of the navy of England was formerly vested in a lord high admiral. James II. when duke of York held this office, and when king, on account of his predilection for the naval service, kept it in his own hands. Prince George of Denmark, husband of Queen Anne, was also lord high admiral. The last incumbent of the office was the duke of Clarence, afterward William IV., who held it from May, 1827, till September, 1828, since which time the office has been put in commission, the duties being performed by the lords of the admiralty, who are six in number, the first lord having a seat in the cabinet. His pay is £4,500 per annum.—The highest officer in the Russian navy bears the title of general admiral.

ADMIRALTY. In England at a very early period the administration of the navy, and of all affairs pertaining to commerce, ships, and navigation, or connected in any way with the high seas or the navigable waters of the realm, seems to have been delegated to a naval officer of high dignity called the lord high admiral, deriving his authority directly from the sovereign, and invested with powers over some of the sovereign's most important prerogative rights. His functions, covering originally all maritime affairs, extended also to the private concerns of the subject in commercial trade. All of his powers which required judicial action were delegated to a court of admiralty, and they still remain its characteristic function. That part of the jurisdiction which was purely executive, and which related especially to the navy and the royal privilege, was at a very early date transferred to other departments or tribunals. Originally, then, the high court of admiralty in England was the court of the lord high admiral, and its judge was his lieutenant. The admiral also appointed vice admirals, and their lieutenants in turn were the judges of the vice admiralty courts in different parts of the kingdom. The commission usually issued to the admiral of England in the 16th and 17th centuries gave him cognizance of "debts, bills of exchange, policies of insurance, accounts, charter parties, contractions, bills of lading, and all other contracts which any ways concern moneys due for freight of ships, moneys lent to be paid beyond the sea at the hazard of the lender, and also of any cause, business, or injury whatsoever had or done on or upon or through the seas or public rivers, or fresh waters, streams, havens, and places subject to overflowing, within the flowing and ebbing of the sea, upon their shores or banks, from the first bridges toward the sea, throughout our kingdom or dominions aforesaid, or elsewhere beyond the seas, or in any parts beyond the seas whatsoever," &c. A commission of the time of Henry VIII. gives to the admiral authority in cases of treasons, robberies, and other crimes on the seas or other waters within the king's maritime jurisdiction. But these commissions, though full and large, are, it must be remembered, of a comparatively recent date; for the admiralty jurisdiction is very ancient, and the "Black Book of the Admiralty," a sort of code of the admiralty law of England, compiled probably about the beginning of the 14th century, contains constitutions of John (1199), Richard I. (1189), and Henry I. (1100), relating to the admiralty. The jurisdiction of the court was modelled after that of the consular courts of the Mediterranean. Its decisions were governed by the practice of those and the like courts on the continent by the ancient customary laws of the sea and commerce, and by those collections—such as the laws of Rhodes and Oléron, the *Waterricht* of Wisby, the Hanseatic ordinances, and the *Consolato del Mare*—which from time to time shaped the admiralty law of Europe. From the course of the administration of the law in those continental courts from which the English admiralty borrowed its procedure, and from the fact that its characteristic jurisdiction related so largely to commercial dealings with the states of continental Europe where the Roman law prevailed, the law and practice of the English court adopted and followed also the principles and rules of that system of jurisprudence. But the Roman law was regarded in those early periods with great jealousy and suspicion in England, and many efforts were made to restrain the jurisdiction of the admiralty within the narrowest possible limit. It was charged in the reign of Edward III. that now the admiralty claimed jurisdiction of trespasses on land and within the bodies of counties, and undertook to regulate the wages of labor and the prices of provisions. As a result of the complaint it was enacted in the 13th year of Richard II. (1390), that "the admirals and their deputies shall not meddle henceforth of anything done within the realm, but only of a thing done upon the sea;" and in the 15th year of the same reign (1392), that "all manner of contracts, pleas, and quereles, and all other things rising within the bodies of counties, as well by land as by water, as afore, and also wrecks of the sea, shall be determined and remedied by the laws of the land, and not before nor by the admiral nor his lieutenant in any wise." The admonitions of these statutes were still further emphasized by a law of Henry IV. (1411), which not only inflicted fines on persons proceeding in the admiralty courts in the forbidden causes, but also fined the admiralty judges who entertained their suits. About the same time the common law courts began to issue their prohibitions to the courts of admiralty, forbidding their interference in certain disputed cases. This matter of prohibitions became the subject of a sort of convention between the judges of the rival courts early in the reign of Elizabeth (1575), which quelled the discord until the next reign. Coke (1551-1633) repudiated the agreement just referred to, though it had been observed for a quarter of a century, on the ground that it was not signed, and that the justices of the queen's bench had never assented to it; and he accordingly sent out prohibitions from his court more fierce than had ever issued yet. There was never much peace with the admiralty courts during his time, and the common law courts had their own way. In 1632 certain ordinances were drawn up by the king and his council and the judges of the two courts, which were again favorable to the admiralty. But these were set aside by the commonwealth, and in turn a new ordinance of that period (1648), still more favorable to the admiralty, was annulled at the restoration, and the common law judges began anew with their prohibitions. The jurisdiction of the court was now very much narrowed, and among the more important branches of it which were lost were cases of seamen's wages, freight, charter parties, claims for the building, repairing, or supplying of ships, and questions involving disputes of title to ships. The statute 3 and 4 Victoria began to repair and restore the damaged capacity of the admiralty. That act extends the power of the court to all cases of salvage or damage, though arising within the body of a county; to questions of title in causes for possession; to cases of damages, bottomry, and wages; to suits for supplies furnished to foreign ships; and to the claims of mortgagees when the ship or her proceeds are under the control of the court. The so-called admiralty court act of 1854, the elaborate merchant shipping act of the same year, and especially and notably the admiralty court act of 1861, "to extend the jurisdiction and improve the practice" of the court, have increased very materially its power, and bear strong testimony to its usefulness in all matters of a maritime character.—The criminal jurisdiction of the English admiralty was anciently very extensive, and included all crimes and injuries committed on the high seas, and the general government of the navy. In later times, however, this branch of its jurisdiction was withdrawn. Cases arising in the public ships of the realm were transferred to naval courts martial by acts of Charles II. and George II.; and cases arising on ships of commerce or in foreign ports were assigned to certain commissioners and courts created by acts of 28 Henry VIII., 39 and 46 George III.. and 4 and 5 William IV., in which tribunals the acts provide that the lord high admiral, or as now the judge of the admiralty, shall be included; and by the operation of still more recent statutes the criminal jurisdiction of the court is almost entirely annulled. Apart from the general, or as it is called the instance side of the court, it has exercised very important functions in time of war as a court of prize. This court is called into being by the special warrants of the crown at the outbreak of each war, and takes cognizance of all seizures of prizes and their condemnation, and all other matters relating to capture. (See PRIZE.)—In France admiralty courts existed prior to the revolution of 1790, and there as in England derived their authority from a lord high admiral. Their jurisdiction was even more extensive than that of the English courts, and included all questions of prize, salvage, bottomry, charter parties, average, wages of seamen, fisheries, and the building, fitting, manning, and sale of ships; and also all crimes or misdemeanors committed on the high seas, except those connected with the navy. These courts were abolished in 1791, and their functions distributed to other tribunals. All commercial questions were assigned to the tribunals of commerce, matters of prizes to a special court called the council of prizes, and the criminal jurisdiction was transferred partly to courts of assize and partly to the correctional police.—In Ireland there also exists, unless very recent changes have been made, a high court of admiralty which is independent of that of England, and has a jurisdiction of the same character and quite as extensive. Such a court also existed in Scotland until it was abolished by statute of 1 William IV., ch. 69. Its jurisdiction on the instance side was transferred to other courts. Its authority in cases of prize and capture had been already, by 6 George IV., ch. 120, vested in the high court of admiralty of England.—The American admiralty exists under the clause of the constitution which declares that the judicial power shall extend to "all causes of admiralty and maritime jurisdiction," and the statute vesting that power, which gives to the district courts exclusive original cognizance of all civil causes of that description. The interpretation of this clause of the constitution has brought out conflicting opinions as to its proper meaning. For upon the principles and rules of construction which are familiarly applied in determining what is the law of the United States in civil or criminal or equity cases, in the absence of specific legislation, the question fairly arises whether the admiralty and maritime jurisdiction contemplated by the constitution was the jurisdiction as it existed in England when the colonies declared their independence, or as it existed in the colonial courts at the time of the revolution, or as it was exercised by the states when the constitution was adopted; whether it was not rather that characteristic and proper jurisdiction of the English admiralty before it was taken away from it by prohibitions or encroachments; or whether finally the clause was not, in a still more liberal spirit, designed to embrace all causes relating to shipping and maritime commerce which, in the broadest sense and within the traditional functions of admiralty courts of full powers, are regarded as maritime and admiralty cases. Though no very definite test by which the extent of the jurisdiction is to be determined has been laid down, yet it is certain that the American jurisdiction does not depend absolutely on any of the criteria suggested by the propositions just recited, and that the clear tendency at least of our decisions is to extend the authority of the court over its ancient domain, without confining it within limits prescribed by any particular historical precedent. Our greatest judges, and eminently Marshall and Story, have construed the constitutional grant with the utmost liberality, and with the purpose of embracing within its scope the largest powers; and especially within the last 20 years the disposition of the supreme court has been to regard all causes of which foreign admiralty courts have usually and characteristically taken cognizance, and which are historically known as admiralty and maritime causes, as being cases within the constitutional provision.—The first statute which drew upon the constitutional grant, and first actually vested its power in our courts, was the act of 1789, by which "exclusive original jurisdiction of civil causes of maritime and admiralty jurisdiction" was assigned to the district courts. This statute, it will be observed, repeats the language of the constitution, and therefore gives no aid to the definition of the power. But the extent of it has been illustrated by a multitude of adjudicated cases, and from these the general character and range of the authority can be easily gathered. The jurisdiction can be most conveniently considered under two aspects: first, as it is determined by the subject matter; and second, as it is determined by the locality. Upon what is probably the right ground of construction, the first of these is the proper criterion; for, as has already been intimated, the reason of the thing depends probably only upon the consideration whether the subject is of a maritime character or not. The early contests which arose in England upon the competency of the admiralty to interfere within the bodies of counties or other land lines have, however, fixed the criterion of locality so firmly that it has been constantly appealed to here; but it has been found singularly embarrassing in this country from the fact that so much of our commerce is carried on on great inland seas, and on great rivers which are navigable through the whole extent of our territory. The European states afford no parallel to these, and to adopt literally the limits of the jurisdiction fixed by the practice of their admiralty courts was to exclude the ships and commerce of all these waters. Nevertheless, the precedents of the foreign admiralty law in these respects were closely followed for fully half a century after the foundation of the government; and though our courts did not submit to the limited jurisdiction by which the English courts were restrained within headlands or the bodies of counties, yet they did hold regularly that no cause came within their power unless it arose within the movement of the tides. At last a case arose in the harbor of New Orleans. There the waters of the Mississippi flow always outward and never backward with the ocean tide; but upon proof that there was nevertheless a perceptible rise and fall of the water, caused by the tides below, it was held that this was sufficient, and that the jurisdiction attached. The decision was admitted to be a forced one, and the tide on which it rested was afterward spoken of in the supreme court rather contemptuously as "an occult tide without ebb or flow." But there was good sense at the bottom of the decision, and the inconvenience of making tide waters the limit of the jurisdiction led to the enactment in 1845 of the famous act "extending the jurisdiction of the district courts to certain cases upon the lakes and the navigable waters connecting the same." This act did not cover the great rivers which do not connect the lakes, nor did it profess to extend a real admiralty jurisdiction even over the waters to which it referred. It created rather a sort of imitation jurisdiction, modelled all the way after the real. The act caused more embarrassment than it relieved, and in fact it has been practically annulled by the supreme court by decisions which declared subsequent to its enactment that the admiralty and maritime jurisdiction given by the constitution was not in fact limited to the high seas and tide waters, but, by its own proper force, covered as well the great interior lakes and rivers wherever they were navigable, so that the act of 1845 was unnecessary and inoperative.—As to the subject matter, it may be said generally that the American admiralty exercises a jurisdiction based largely upon that of the English court in the time of Edward III., and embraces all maritime causes of action, as well matters of contract as matters of tort, and under the latter covers all injuries and damage done upon the seas, even though done in a port or harbor or within the body of a county. With reference to the contracts which are within the reach of the court, the distinction must be first made between those which directly and of themselves touch maritime affairs, and those which are only preliminary or subordinate to such agreements; for the former the court will pass upon, but it will not upon the latter. Thus a charter party or, as within a year or two it has been decided, a policy of marine insurance is a maritime contract which the court will aid in enforcing; but it has no power in respect to an agreement to make a charter party or a policy. The distinction in these cases is rather obvious and reasonable, but it is not so clear as to some other cases. For example, the earlier maritime law, as it was administered in those periods and courts to which our court appeals for tests of jurisdiction, covered all contracts which concern the ship, and thus included all contracts for building, repairing, supplying, or equipping her. But as to a contract for building a ship, our supreme court has held that it was not within its jurisdiction. It may be observed, however, that the court in Massachusetts has since decided the contrary, and also that the recent English admiralty court acts expressly confer jurisdiction in such cases upon the court. The court does without hesitation entertain suits by material men for repairing and supplying the ship and for towing her, and even claims for shipping a crew and procuring a cargo; but it has declined to hear actions by stevedores and ship keepers, or claims for advertising the vessel for sea or preparing her cargo for stowage, or for the wages of lightermen, and even claims for scraping the ship's bottom preparatory to coppering her. The jurisdiction also includes what are called possessory and petitory actions respecting a ship—that is to say, cases in which the title to possession of the ship is involved, and cases of dispute between part owners as to their interests in the employment of the vessel; contracts of affreightment, either at the instance of the owners for their freight, or of the shippers for damages for the non-fulfilment of the contract of carriage, and also contracts for the carriage of passengers; cases of jettison and average, bottomry and respondentia bonds, and all hypothecations of ship or cargo; of salvage, collision, surveys, and sales of condemned vessels; demurrage, pilotage, and wharfage, and seamen's wages—and all persons stand on the footing of seamen who serve or are useful in the navigation of the ship, including cooks and carpenters, coopers on whaling voyages, and firemen and engineers and deck hands on steamboats. The court has also jurisdiction of all assaults and batteries, imprisonment or improper treatment of sailors or of passengers, and all other damages and injuries done on the high seas and navigable waters, and also of questions of prize and of seizure under the revenue and navigation laws. (See Prize.) With respect to the relations of the federal and the state courts, it is now settled, but it was not until very lately, that the jurisdiction of the former in admiralty suits *in rem* is exclusive, and consequently none of the states can give their local courts power, under statutes, to enforce liens *in rem* which are of a purely maritime and admiralty nature.—Though the court of admiralty exercises its jurisdiction upon principles of equity and natural justice, and may administer equitable relief upon a subject which is fairly within its characteristic powers, yet it is not in the ordinary sense a court of equity, and cannot intervene in that class of cases which are peculiarly passed upon in such a court; and though it construes the contracts and obligations of parties before it less strictly than the courts of common law, and will mitigate the severity of contracts or moderate exorbitant demands, yet it will not assume to go further and grant purely equitable relief. Thus it cannot entertain a bill for the specific performance of a contract for the sale of a ship, for the execution of a trust, for the correction of a mistake, or the reformation of an instrument, on that ground, or grant relief against fraud; and it was even expressly held that it cannot in general order an accounting between part owners, or aid in cases of mortgage of a ship so as to decree foreclosure, or vest title in the mortgagee upon a sale. The court in its equitable spirit will also disregard technicalities in procedure, and looks at the matter rather than the form, to the end that the party entitled to it shall receive substantial justice without regard to formal irregularities or defects.—In the United States there are no courts which possess an admiralty jurisdiction solely. It is exercised in all cases by the federal courts, as a branch and part of the full powers delegated to them. The original jurisdiction is vested exclusively in the district courts. From these appeals lie to the circuit courts in admiralty and maritime causes, when the matter in dispute exceeds the value of $50, and from these to the supreme court when it exceeds the value of $2,000. Upon an appeal in admiralty to the circuit court, unlike the course in such proceedings in other courts, the parties may have the whole cause heard *de novo*, and the cause is not in fact *res adjudicata* or finally decided until such appeal is waived or sentence is reached in the appellate court. The case may therefore go before the circuit court upon the same testimony taken below, or the parties may introduce new evidence there and have all the proceedings as well of fact as of law in the court below reviewed. And even the supreme court, sitting on an admiralty appeal, is very liberal in permitting amendments and additions; and if justice require that the pleadings be reformed or a new claim brought into the case, that court will refer the cause back to the circuit court for this purpose. But in regard to appeals brought up on the same testimony presented below, the supreme court has lately declined to reverse decisions as to matters of fact in which the district and circuit courts have agreed.—The practice of the admiralty courts is simple, and their procedure direct and expeditious, and intolerant of technicalities; their administration of the law is liberal and equitable, trusting rather to the matter than to the form, and seeking always to insure quick remedies and to give relief upon the actual merits of the case. The practice is regulated in some of its details by rules framed by the district courts. They differ somewhat in the different districts, but not materially. The forms of proceedings are modelled upon those of the Roman civil law as it has been fashioned in European courts, and especially in European courts of admiralty. The suit is instituted by the filing of a libel, which is a mere statement in the simplest narrative form of the libellant's cause of action. Upon this the court issues its process directing the marshal, in an action *in personam*, either simply to call the defendant into court to answer, or, if such process be prayed for, to arrest him or attach his goods; or if the suit is *in rem*, it directs the marshal to take the thing into his custody, and to give due notice to all persons claiming it to come and show cause why it should not be condemned; the theory of the proceeding *in rem* being that the thing proceeded against, rather than any person, is to satisfy the libellant's action. The defendant puts in an answer, and if he is the owner of the thing proceeded against in an action *in rem*, he puts in also a claim to the property, and may remove the hold of the court upon it by giving a bond for its value. In matters of contract, the cause is brought to a hearing before the judge; and previous to the final hearing by the court the evidence of witnesses about to leave the district, as for example of sailors or officers of ships, may be taken out of court before its commissioners.

ADMIRALTY ISLANDS, a group in the S. Pacific, N. E. of New Guinea, between lat. 2° and 3° S., and lon. 146° and 148° E. They consist of one large island, Admiralty or Basko, in the centre of the group, between 50 and 60 m. long, one (Matthew) of about 117 sq. m., 150 m. N. E., and 20 or 30 much smaller ones. They are generally low and fertile, though Basko has high mountains, and abound in cocoanut trees. The inhabitants are nearly black, well formed, and of good features, and go almost naked. The islands were discovered in 1616 by a Dutch navigator, Cornelius Schooten (hence sometimes called Schooten's islands), rediscovered in 1767 by Carteret, who gave them the present name, and have been very seldom visited since, access being difficult on account of the coral reefs which surround them.

ADMONITION, a part of ancient church discipline. If the offence was of a private nature, the warning was given in private; otherwise before the assembled church. If the person censured did not amend his ways, excommunication followed.

ADOBE HOUSES, dwellings built of unburnt brick, in common use in Mexico, Texas, and Central America. Adobe bricks are made of loamy earth, containing about two thirds fine sand and one third clayey dust, which under the action of the sun becomes a hard, compact mass, without a crack. Four men generally work at the making of these bricks, one to mix the mass, two to carry it in a hand-barrow, which is sprinkled with finely powdered dry manure or dust to prevent adhesion, and one to mould the prepared substance into bricks. The moulds are double, each 16 to 18 inches long, 9 to 12 inches wide, and 4 inches thick, and have projecting handles at each end, but no bottom, the brick being deposited on the surface of the ground, which has been previously levelled; and the adobes are carefully turned on the edge, and left to harden in the sun. They are laid with mud mortar, made from the earth at the foot of the wall; and on the completion of every two feet of the structure, an interval of one week is allowed for drying, and a similar space of time between the completion of the walls and fixing of the roof. The houses are usually one story high, and the inside plastered before the roof is put on, so that it may dry with the walls. An adobe house costs little; it is warmer in winter and cooler in summer than either wood or brick, and its duration is extraordinary, adobe houses 50 feet high being in existence which have stood for more than a century.

ADOLPHUS. I. John, an English advocate and author, born in London in 1766, died July 16, 1845. He studied in London, was admitted attorney and solicitor in 1790, and was called to the bar in 1807. He soon obtained the character of an adroit, skilful counsellor, and practised chiefly at the Old Bailey in criminal cases. His forensic reputation was not fully established till 1820, when, on the trial of the "Cato street conspirators," he defended Arthur Thistlewood, charged with high treason, with marked ability, though his client was convicted. From that time his practice at the bar was large and lucrative, but his warmth of temper frequently led him into undignified squabbles. His reports are referred to as authority. His principal works are: "The History of England from the Accession of George III." (3 vols., 1805, of which a new edition enlarged to 7 vols., but still unfinished, appeared shortly before his death), and "Biographical Memoirs of the French Revolution." See "Recollections of John Adolphus," by his daughter (1871). **II. John Leycester,** a barrister, son of the preceding, highly distinguished himself at the university of Oxford, and published in July, 1821, a work which Lockhart says "was read with eager curiosity and delight by the public, with much diversion, besides, by his [Sir W. Scott's] friends, and which Scott himself must have gone through with a very odd mixture of emotions." This book is entitled "Letters to Richard Heber, Esq., containing critical remarks on the series of novels beginning with Waverley, and an attempt to ascertain their author." The purpose of this book was to prove, from Scott's acknowledged writings, and from other known circumstances connected with his personal history and position, that he and none other could be the author, sole and unassisted, of the Waverley novels.

ADOLPHUS FREDERICK, of Holstein-Eutin, king of Sweden, born May 14, 1710, died Feb. 12, 1771. In 1727 he was elected prince-bishop of Lübeck as successor of his father. On the death of his cousin Charles Frederick, duke of Holstein-Gottorp, in 1739, Adolphus Frederick became the administrator of his possessions during the minority of his son, afterward Peter III. of Russia. The king of Sweden, Frederick of the house of Hesse-Cassel, being childless, and the young duke of Holstein-Gottorp having declined to become heir apparent at a time when he hoped to succeed to the throne of Russia, it was decided in 1743, by virtue of the treaty of Abo between Russia and Sweden, that Adolphus Frederick should occupy the position, so that it might be at all events vested in the Holstein family. The grandmother of Adolphus having been a daughter of Charles XI. of Sweden, this circumstance was also regarded as favorable to his election, which was ratified by the Swedish diet on July 3, 1743. In 1744 he married Louise Ulrike, a sister of Frederick the Great, and he ascended the Swedish throne April 5, 1751, on the death of King Frederick. The aristocracy being favorable to France, Sweden was dragged into the seven years' war against Prussia; and the attempts of the queen to oppose this policy resulted only in bringing the ringleaders against the aristocracy to the scaffold (1756). The council of state sided with the aristocracy against the crown, and it was only after the king's threatening to abdicate that the Swedish diet consented to sustain his rights and protect him against the aggressions of the nobles. He was an upright prince, but by his meekness he encouraged the schemes of France and her allies among the nobility. He was succeeded on the throne by his son Gustavus III.

ADOLPHUS OF NASSAU, a German sovereign, born about 1250, fell in battle near Worms, July 2, 1298. He was the second son of Walram IV., count of Nassau, and was distinguished for valor in the service of Rudolph of Hapsburg. On the death of the latter he was, at the suggestion of the archbishop of Mentz, unanimously elected as his successor (May 10, 1292), in place of Rudolph's son and heir Albert. He was crowned at Aix-la-Chapelle as king of Germany, June 24, 1292, but not in Rome as emperor. Adolphus disgraced himself by accepting an English subsidy of £100,000 for joining in the war against France, and by backing out of the bargain without restoring the money. He further lost caste by his mercenary but fruitless transactions with the landgrave Albrecht of Thuringia for the acquisition of his territory. The archbishop of Mentz, in concert with Albert of Austria, caused Adolphus to be arraigned before the college of electoral princes. On his declining to comply with the summons, his deposition was proclaimed, June 23, 1298. But Adolphus appealed to the arbitrament of arms. The rivals met, with their respective armies, between the villages of Göllheim and Rosenthal, near Worms. Adolphus fell, hit in the face, as was reported at the time, by the lance of Albert, whose companions gave him the death blow. Under Henry VII. his remains were placed beside those of his successor Albert I., in the vault of German sovereigns at Spire.

ADONAI, one of the appellations of the Supreme Being in the Hebrew Scriptures, signifying Lord, or my Lord. The Jews, who refrain from uttering the name of Jehovah, pronounce Adonai in its place where it occurs in the Hebrew text, in which they have also substituted the vowels of Adonai for those of the name, thus rendering the right pronunciation of the latter doubtful.

ADONIA, feasts anciently held in honor of Venus and Adonis. They lasted two days; the first was spent in tears and lamentations, the second in mirth and feasting. The festival typified the dying and resurrection of nature.

ADONIS, in Greek mythology, a beautiful youth beloved by Venus. According to the account received from the cyclic poet Panyasis, he was the son of Theias, king of Assyria, and his daughter Smyrna. Venus, discovering the beauty of the child, hid him in a chest, which she intrusted to Proserpine. Hence resulted the dispute between these goddesses as to which of them Adonis should belong to, which was settled by the judgment of Jupiter that he should remain with each of them an equal part of each year. Adonis died of a wound received from a wild boar in the Idalian woods, and the sorrow of Venus for his loss was so great that the gods allowed his return to earth for six months of every year to console her.

ADOPTIANI, a Christian sect in Spain, founded by Elipandus, archbishop of Toledo, and Felix, bishop of Urgel, near the close of the 8th century. They affirmed that Jesus was really the son of God only in his divine nature, and the son of God by adoption merely in his human nature. So long as they confined their efforts to spreading their views in the Mohammedan territory, no notice was taken of the new sect. But when, through the efforts of Felix, whose diocese belonged to the Frankish empire, adoptianism began to spread in the dominion of Charlemagne, the subject was brought to the notice of that emperor, and the synod of Ratisbon (792) condemned it as a renewal of the Nestorian heresy. Felix recanted, and confirmed his recantation before Pope Adrian in Rome. But after his return to Urgel he reaffirmed his adoptian views. At the request of Charlemagne Alcuin wrote an epistle to Felix against adoptianism. This step, however, had no results; on the contrary, a number of the Spanish bishops declared their agreement with Felix. A new synod convened at Frankfort (794) ratified the decrees of Ratisbon against adoptianism. Finally, Archbishop Leidrad of Lyons prevailed upon Felix in 799 to appear before a synod at Aix-la-Chapelle, when, after a protracted discussion of the subject with Alcuin, he once more recanted. Felix was now committed to the charge of Leidrad at Lyons, where he died in 816. Elipandus never retracted his opinions, but soon after his death the sect became extinct. Adoptianism was the first important theological controversy concerning the person of Christ originating in the western church.

ADOPTION, the taking of another's child as one's own, still regulated by law in Germany and France, as it was in Rome. Where the party adopted is under age, and actually under the parents' power, it is called adoption proper; but where it is of age, *sui juris*, adrogation. The abstract rule that adoption must imitate nature, though derivable from regulations of the Roman law, such as that forbidding eunuchs to adopt, and that requiring the adopter to be at least 18 years older than the adopted, is not fully carried out, since by the same law those incapable of procreation may adopt. In Germany, while the child is more completely absorbed into the family of the adopter than he was in Rome, numerous subtle distinctions have been engrafted upon this title of the law; while the *Code Napoléon* admits adoption only to a limited extent. A prerequisite to adoption in Rome was leave from the college of priests; in Germany the sanction of the prince or judge is required. In Texas, a person may adopt another to be his legal heir by filing a statement, authenticated like a deed, expressing his intention so to do, with the county clerk, thereby entitling him to all the rights and privileges of a legal heir, except that if the adopter have a legitimate child or children, the adopted shall in no case inherit more than a fourth part of the testamentary estate of the adopter. In several of the states adoption has been made the subject of recent statutes; for example, in Illinois (1867) and Kansas (1868). The proceeding under these acts is in general similar to that which has existed for a long time in Massachusetts. In that state, any person may present a petition to the probate court for the adoption of a child not his own, and, if desired, for a change of the child's name. If the petitioner has a husband or wife, the application will not be entertained by the court unless such husband or wife join in it. The consent of the child's parents, or of the survivor of them, must be procured in writing; or if it has no parent, its guardian or next of kin or some person appointed by the court must give the requisite consent. And the adoption will not be sanctioned without the child's consent, if it is more than 14 years old. The child thus adopted, for all purposes of inheritance, and in respect to all the other legal consequences and incidents of the natural relationship of parent and child, is deemed the child, born in lawful wedlock, of the person who adopts it, except that it shall not take property limited to the heirs of the body of the new parents, nor coming from their collateral kindred. An appeal from the decision of the probate court upon the petition lies in favor of either the petitioner or the child to the supreme court; and any person interested who had not actual notice of the proceeding may apply within a year for a reversal of the order of the probate court. In Louisiana the proceedings are more like those of the civil law. The person adopting must be at least 40 years old, and at least 15 years older than the person adopted. Married persons must concur about the adoption.

ADOUR (anc. *Aternus*), a river in the S. W. of France, about 180 m. in length, 70 of which are navigable. Its course is nearly semicircular. It rises in the Pyrenees, flows through the departments of Hautes-Pyrénées, Gers, and Landes, and empties into the bay of Biscay, a little below Bayonne. Though many streams unite with it, its volume of water is small, except during the melting of the snows in the Pyrenees, when it often inundates the surrounding country.

ADOWA, one of the chief towns of Abyssinia, capital of Tigré, about 145 m. N. E. of Gondar; pop. about 8,000. It is the great depot of the trade in cattle, corn, salt, and slaves, between the coast and the interior. The chief manufactures are of cotton.

ADRASTEA (Gr. Ἀδράστεια, she whom none can escape), in Greek mythology, a goddess of just retribution, like Nemesis, or, according to some of the poets, identical with her.

ADRASTUS, a legendary king of Argos, in the history of ancient Greece. His father was Talaüs, king of Argos. Being expelled from Argos, he took refuge in Sicyon, and there succeeded to the throne, and instituted the Nemean games. He was subsequently restored to his native city, and married one of his daughters to Polynices, son of Œdipus and brother of Eteocles, who had been deprived by the latter of his share in the reign over Thebes. He now formed a union of Greek heroes to restore his son-in-law to his throne, and led the famed expedition of the "seven against Thebes," the abundant theme of later tragedy. Adrastus alone survived, saved by the fleetness of his horse Arion. Ten years later he prompted the seven sons of the defeated heroes to renew the war. Their expedition, known as that of the epigoni or descendants, set out with promises of success from the oracle, and ended with the capture and complete demolition of Thebes. The son of Adrastus was the only Argive that fell, and Adrastus himself soon after died of grief.

ADRIA, a town of Italy, in the Venetian province of Rovigo, on the canale Bianco, between the mouths of the Adige and Po, 30 m. S. by W. of Venice; pop. 13,000. The inundation of these rivers gradually rendered the country uninhabitable, and their deposit of soil caused the sea to recede until the town, anciently a seaport, is now 14 m. inland. It is a bishop's see, and has a celebrated museum of Etruscan and Roman antiquities. The ruins of ancient Adria, or Hadria, founded by the Etruscans, lie S. of the modern town. The name of the Adriatic sea is derived from it.

ADRIAN, a city and the capital of Lenawee co., Mich., on the S. branch of the Raisin river, and on the Michigan Southern railway, 74 m. W. S. W. of Detroit; pop. in 1870, 8,438; in 1860, 6,213. The city is well built and paved, and lighted with gas. It commands the trade of an extensive grain-growing region. The stream on which it is situated furnishes good water power. The principal industrial establishments are: a car factory employing 250 men, a brass foundery employing 100, two iron founderies, two sash factories, two planing mills, two organ factories, and three flour mills. The city possesses a fine monument to the memory of 77 citizens of Adrian who fell in the civil war. There are eleven churches and five public school houses. Adrian college, founded in 1859 by the Protestant Methodists, admits both sexes, and has an average attendance of about 160 students. The central union school building is one of the finest in the West. Three papers are published here, one monthly (educational), one weekly, and one daily and weekly. The first house in Adrian, a log dwelling, was built in 1826. The village was laid out in 1828, and it was incorporated as a city in 1853.

ADRIAN, a Roman emperor. See Hadrian.

ADRIAN, the name of several popes. **I.** Born at Rome, succeeded Stephen IV. in 772, died Dec. 25, 795. Desiderius, king of the Lombards, having invaded the provinces which Pepin had presented to the Roman see, Adrian solicited the assistance of Charlemagne, who entered Italy, and overthrew the power of the Lombards in 774. In return the Frankish conqueror received from Adrian the title of king of Italy and patrician of Rome. In 791 Rome was inundated by the Tiber, when Adrian distributed provisions in boats. He also rebuilt the fortifications of Rome. **II.** Born at Rome, succeeded Nicholas I. in 867, and died in 872. He had been married, but left his wife to live in celibacy. During his pontificate the schism between the Greek and Latin churches was begun by the secession of Photius, patriarch of Constantinople. **III.** Born at Rome, was made pope in 884, and died in 885, on his way to the diet at Worms. **IV.** Nicholas Breakspear, the only Englishman who ever filled the papal chair, became pope in 1154, and died in September, 1159. He is said to have left England as a beggar, became a monk and afterward abbot of St. Rufus in Rome, and was made cardinal bishop of Albano by Eugenius III., who sent him as his apostle or legate to Norway and Denmark. On the death of Anastasius IV. he was, much against his will, elected pope. Rome was at this time in a state of great confusion, resulting from the reformatory preaching of Arnold of Brescia. Immediately after his election he placed Rome under interdict, prohibited all religious services, and banished Arnold, who was subsequently surrendered on Adrian's demand by Frederick Barbarossa, and tried and executed at Rome. Shortly afterward Adrian crowned Frederick emperor of Germany; but some trifling dispute occurring as to the forms to be observed in the ceremony, a general conflict took place between the Roman and German troops, in which many lives were lost. Adrian afterward became involved in numerous quarrels with Frederick, which was the origin of that bitter enmity between the papal see and the Hohenstaufens, which ended only with the fall of the latter. **V.** A Genoese, succeeded Innocent V. in 1276, and died five weeks after his election. **VI.** Son of an obscure mechanic of Utrecht named Boeijens, born in 1459, died Sept. 24, 1523. He was known only by the name of Adrian, was educated at Louvain, and became professor of theology there and vice chancellor of the university. Maximilian I. chose him as preceptor of his grandson (Charles V.), and subsequently sent him as ambassador to Spain, where he became bishop of Tortosa. After the death of King Ferdinand (1516) he shared the regency with Cardinal Ximenes, and in 1517 was made cardinal. On the departure of Charles V. for Germany in 1519 Adrian was left sole governor, and showed remarkable feebleness in his treatment of a powerful insurrection (war of the communities, or of the holy league) caused by oppressive taxes, and especially by the excessive favors showered upon the Flemings, but which was finally suppressed by a council appointed by Charles V. He was elected pope in 1522, as successor of Leo X., and entered Rome Aug. 31. The simplicity which he introduced at the papal court, contrasted with the magnificence of his predecessor, excited contempt and discontent among the people; while his ecclesiastical reforms, and his humility in acknowledging the errors of the papacy while dealing with the schism of Luther, were very distasteful to the clergy. He was the author of several pious works, in one of which, published after his accession, though written previously, he held that a pope might err even in matters of faith.

ADRIANOPLE (anc. *Hadrianopolis; Turk. Edirneh;* Fr. *Andrinople*), a city of European Turkey, capital of the vilayet of Edirneh, situated on the Maritza (the ancient Hebrus), in ancient Thrace, about 130 m. N. W. of Constantinople. The population is variously estimated from 100,000 to 150,000, at least one third of whom are Greeks, and the rest Turks, Armenians, Jews, Franks, &c. The scenery of the city is beautiful; the gardens on the banks of the Maritza and the neighboring village of Hisekel, inhabited by the wealthy merchants, are delightful; but the interior of the straggling city is, like that of most Turkish towns, dirty and desolate. Even the picturesque effect of the 40 mosques, among which is the famous one of Selim II., built of materials furnished by the ruins of Famagosta in Cyprus, is impaired by the wretched surroundings. The most capacious bazaar, named after Ali Pasha, is the centre of trade, which is considerable, the city being the focus of the whole of Thrace. It is also the residence of a governor general, a Greek archbishop, foreign consuls, and missionaries. Wool, silks, cotton, dyestuffs, carpets, opium, and attar of roses are the principal articles of commerce. Quince preserve is one of the special products of Adrianople.—The town was founded by the emperor Hadrian, and soon attained great commercial and military importance. It was the scene of famous encounters in the times of the Romans, the Byzantine empire, and the crusades. Frederick Barbarossa concluded a treaty there in 1190 with the Greeks, and Baldwin I. was defeated and captured in the city in 1205 by the Bulgarians. Taken by the sultan Murad I. in 1361, it remained the Turkish capital until the taking of Constantinople in 1453. Charles XII. spent some time in 1713 in the neighboring castle of Timurtash, previous to his residing at Demotika. In 1829 Adrianople was captured by the Russian general Diebitsch, and a treaty of peace was signed there on Sept. 14, 1829, between Russia and Turkey, in virtue of which the Danubian principalities were restored to the Porte. The Pruth, and from its mouth the Danube, were made the dividing line between the two countries, and the boundaries of their respective Asiatic possessions were agreed upon. Russia obtained the privilege of trading with all parts of the Turkish empire, the navigation of the Danube, the Black sea, and the Mediterranean, and the passage of the Dardanelles, upon the same terms with the most favored nations, besides a full indemnity for her war expenses.

ADRIATIC SEA, the portion of the Mediterranean lying between Italy on the W. and Turkey and Austria on the E., takes its name from the city of Adria. Its length from the strait of Otranto (which connects it with the Ionian sea) to the head of the gulf of Trieste is about 500 m.; its average width about 130 m., which, northward from the mouth of the Po, is reduced to about 60 m. by the peninsula of Istria. The Adriatic receives few rivers of importance, except the Adige and the Po. The western coast is generally flat and swampy; its harbors are few and poor. The eastern shores are steep and rocky, and the numerous islands along the Dalmatian coast furnish vessels a safe shelter from storms. The northwestern part of the Adriatic is known as the gulf of Venice, the northeastern as the gulf of Trieste. On the Neapolitan coast lies the gulf of Manfredonia, on the Dalmatian the gulf of Cattaro, and on the Albanian that of Drino. During summer the navigation of the Adriatic is usually free from danger, but the S. E. winds that blow in winter produce disastrous shipwrecks. Its depth between Dalmatia and the outlets of the Po is 22 fathoms; but opposite Venice, and in a considerable portion of the gulf of Trieste, it is less than 12 fathoms. To the southward it deepens rapidly. Its waters are more salt than those of the Atlantic. The tides are almost imperceptible. There can be little doubt that the dimensions of the Adriatic were formerly much greater than at present, and that they have been contracted by the deposits of mud made by the streams that empty into it. On the western coast several lagoons produced by sand bars are being rapidly transformed into meadows by this process. The original depth of the Adriatic has likewise been diminished by the accumulations of sandy marl and testaceous incrustations at the bottom.

ADULLAM, a town of ancient Palestine, in the lowland of Judah, the seat of a Canaanitish king before the Hebrew conquest. It was fortified by King Rehoboam. Its location, like that of the "cave of Adullam," where David hid when pursued by the Philistines, has not yet been sufficiently identified.

ADULTERATION, a term applied to the deterioration of different articles of food, drugs, &c., by mixing them with cheap and inferior substances. The microscope has become a very important instrument in detecting fraudulent mixtures. In wheat flour it detects the mixture of rice flour, and in the maranta arrowroot it exposes the peculiar structure of the cheap potato flour and sago. In mustard and coffee it brings out the peculiar forms of chiccory root; and in the former turmeric has been detected by it, when this was added only in the proportion of $\frac{1}{500}$ part. Poisonous ingredients, being mostly of a mineral nature, are subjects rather of chemical analysis than of microscopic examination. There is an instance, however, of cattle having been poisoned by eating rape or oil cake, in which were detected by Dr. Hassall the ground seeds of the mustard. Chemical analysis in such a case could discover nothing. It is to Dr. Hassall, the author of scientific papers in the London "Lancet," and of several works on food and its adulterations, that the credit is principally due for the progress made in this department of science, at least in its applications to this subject. In some vegetable powders, Dr. Hassall has succeeded in detecting nine different vegetable productions. The mineral poisons that are made use of to give light colors to confectionery, and the fine green shades to pickles and to tea, are only brought to view by chemical analysis. By these, however, they are separated quantitatively, and in forms that are recognized by every one. The mistaken taste of the public for very white bread leads the baker to select the flour from which the more nutritious portion of the grain has been separated by the miller, and to make this flour still more white he adds to it a quantity of alum. Though the use of this substance in bread is forbidden by law in England, it was found in every one of 53 samples that were examined for it. Cheaper and less nutritious kinds of flour, as of rice, potatoes, corn, beans, rye, &c., are mixed with wheaten flour, some of which, besides their direct effect in lessening the value of the article, also cause the bread to absorb much more water, and thus add to its weight by substituting water for flour. Carbonate and sulphate of lime, silicate of magnesia in the form of soapstone, white clay, carbonate of magnesia, bone dust, and bone ashes, have all been detected in flour in England. In the adulterations of tea, especially green tea, the ingenuity of the Chinese is taxed before it leaves their country, and that of the English on receiving it in their own. The list of other plants which furnish leaves for the tea chests, and which are recognized by the microscope, is too long for repetition here, and so of the poisonous mineral ingredients, including arsenite of copper, which are skilfully used to make good green teas of unsalable black teas. Coffee fares somewhat better, its adulterating mixtures being of a more harmless nature, such as chiccory, acorns, mangel-wurtzel, peas, and beans, and for the use of the poor in London roasted horse liver. In an analysis made in 1872, under the direction of the Massachusetts board of health, a pound package of a mixture sold as ground coffee was found to contain no coffee whatever; but coffee sold in bulk was nearly always found pure. Sugars are more decidedly free from adulteration, but the brown sugars, as usually imported, are found from the accidental impurities present, and from the immense numbers of live animalcules, to be in a state unfit for human consumption. The white lump sugars are very pure, and any insoluble substance like sand can be easily detected. No articles, however, have been the subjects of such a reckless system of adulterations as the colored sugar confectionery. Though expected to be used principally by children, the colors painted upon the candies and sweetmeats are the product of virulent mineral poisons; and it is wonderful what a variety of these have been made applicable to this purpose. Their use, however, is not now nearly so great as it was in former times, and is discountenanced by reputable dealers in these articles.—Wines and spirits, from their high value and general use, as also from the difficulty of detecting the cheap mixtures added to them, are almost universally adulterated to some extent; while many are made up entirely of ingredients wholly foreign to the country which produces the genuine wine. The substances added with a view of preserving wines are sometimes poisons, lead and copper both being used, the former in the state of litharge. In England the favorite port wine is thus most shamefully treated, besides being manufactured on a very large scale, after a variety of curious recipes, from thousands of pipes of spoiled cider imported for the purpose, bad brandy, and infusions of logwood and other dyestuffs. The champagnes, which are more in demand in this country, find here as ingenious imitators; and from our native ciders, with a due mixture of cheap French wine, sugar, brandy, and a little lemon or tartaric acid, more champagne is bottled than ever crosses the Atlantic. If gooseberry wine is easily obtained, it is used instead of cider for making good champagne. The impossibility of supplying the demand for French brandy, and the consequent high price of the article, have led to its extensive manufacture in France from very cheap materials. These materials are water and spirits obtained from molasses, beet root, and potatoes, and more particularly cheap whiskey, which is sent from this country in large quantities to come back brandy. Burnt sugar gives the desired color, and the fine flavor is made to suit the taste by skilful admixtures of essential oils and distilled murk, which is the refuse skins and pips of the grape left after the wine is expressed. This stuff is imported into England, to be distilled with molasses for making brandy. Gin is largely adulterated with water, and as the effect of this is to make the liquor whitish and turbid, other substances must be added to correct this and "fine" the gin. These are alum, carbonate of potash, and the poisonous acetate of lead. To restore its strength and pungency, cayenne in the form of tincture of capsicum, or grains of paradise, are employed; and its peculiar aroma is preserved by compounds called "gin flavorings," the ingredients of which are juniper berries, coriander seeds, almond cake, angelica root, licorice powder, calamus root, and sulphuric acid. The common whiskey of the country is largely diluted in the distilleries with water, and then to restore the strength the lye of ashes, which is prepared for the purpose, is added in sufficient quantity to give the liquor the character which is expressed by the slang name by which it is called of "rotgut." The report of the Massachusetts board of health, already referred to, shows that the adulteration of vinegar with sulphuric acid is extensively practised, especially in wine vinegars. Lead is also found in vinegar, often coming from lead faucets.—It has been supposed that the adulteration of drugs was very generally practised, and almost without check. Were this the case, medicine would indeed be in bad repute; for in no department would this practice be followed by more disastrous consequences. That it is largely adopted, the analyses of our most respectable druggists prove; but these also show that the system may be exposed, and in a great measure checked, by those disposed to do so; and further, that the articles used for sophistication are generally of a very harmless nature. In July, 1848, a law went into effect in this country, forbidding the importation of these dangerous mixtures. But while the effect of this has been to exclude foreign adulterations, the manufacture of them at home has been greatly increased. In the first year after its establishment, it appears by the report of Dr. J. M. Bailey to the New York academy of medicine that over 90,000 pounds of drugs, comprising Peruvian bark, rhubarb, jalap, senna, and various other kinds, had been rejected and condemned in the ports of the United States. It is very questionable, however, among druggists, whether after all the sale of spurious medicines has been seriously diminished. The adulteration of Turkey opium is carried on as a regular business at Marseilles. It is there literally made over again. The greatest variety of impurities are introduced into it; besides extracts of the poppy and other plants, sand, ashes, gums, aloes, small stones, pieces of lead and iron, seeds and stems of plants, are freely used. In England the same practice has been so successfully pursued, that what appeared to be the best Turkey opium has proved entirely destitute of the active principle of the drug. The essential oils, used more particularly for perfumery, are especial objects of adulteration. Oil of wormwood, we notice upon the test book of one of our most respectable druggists, "warranted pure from Boston," contained about 40 per cent. of a mixture of chloroform and alcohol, besides some resin or fixed oil. Such adulterations may be detected by the greatly reduced boiling point of the fluid. Scammony, which is extensively used as a drastic purgative, was before the passage of the law always very impure. At Smyrna its adulteration is still a regularly established business. The article called cake scammony, bought and sold in this country, is considered good if it is found to contain 20 per cent. of the genuine material; and virgin scammony passes if it contains no more than 20 per cent. of foreign matter. This is usually starch. Chalk and flour are also used.

ADULTERY, the voluntary sexual intercourse of a married person with another than the husband or wife. As a topic of the law, adultery may be considered, first, as a ground of divorce; second, as a criminal offence. I. *In civil cases.* The adultery of either party to the marriage contract is now a ground for absolute divorce in almost all Protestant states. It was not so, however, either in Scotland or England until the reformation; and after that, though in the former country divorces *a vinculo* were allowed for adultery, the law remained unchanged in England for a long time, and as it had been administered in the spiritual courts ever since the Catholic period; and by the ecclesiastical law marriage was held to be an indissoluble contract, and divorces from it were prohibited. The consequence was, that though divorces *a mensa et thoro*, or rather separations from bed and board, were granted, the only absolute divorces to be had in England were those procured from parliament upon petition. Proceedings of this character were very expensive and cumbrous; and besides, it was the almost uniform practice of parliament to grant divorces to husbands only, and to refuse them to wives. The divorce act of 20 and 21 Victoria, ch. 85, has partly removed this invidious distinction; but not even now have husband and wife in England equal legal rights and remedies in this respect. Under this statute the husband may have a dissolution of the marriage when the wife has since its celebration been guilty of adultery; but the wife may have such relief only when the husband since the marriage has been guilty of incestuous adultery; or of adultery with bigamy; or of rape, sodomy, or bestiality; or of adultery coupled with such cruelty as, without adultery, would have entitled the wife to a divorce from bed and board before the statute; or of adultery coupled with desertion without reasonable excuse for two years and upward. The incestuous adultery of this statute is declared to mean adultery with a woman with whom the husband could not have contracted a valid marriage, on account of her relationship to him within the prohibited degrees of affinity or consanguinity; and the bigamy of the statute means marriage of the husband with another woman during the life of his lawful wife, whether within or beyond the realm.—It has been shown that by the common law of England, at the time of the settlement of this country, adultery was ground only for a divorce *a mensa;* and as our law followed that of the parent state, the common law of the United States was to the same effect. But as the power to grant such divorces was vested in England in the ecclesiastical courts, and no such tribunals were ever erected here, the jurisdiction over divorces was granted to our common law courts by special statutes. But these statutes did not limit the relief, as in England, to mere separation, but have almost universally made adultery the cause for absolute divorce; also, here as in Scotland, the law makes no distinction in favor of the husband, but administers the remedy in favor of either party to the marriage, and for the same grounds.—In reference to divorce, it is immaterial whether the paramour of the adulterous husband or wife be married or single. It is essential to the action for divorce that the adultery be voluntary. Thus a woman is not guilty of it in having intercourse with a man whom she innocently supposed to be her husband, nor if she committed the act in a state of insanity, or was forced to it by a ravisher. It has been held otherwise in Pennsylvania in regard to insanity, Chief Justice Gibson declaring that insanity so great as to efface from the mind of the wife the first lines of conjugal fidelity will be no defence to the husband's action for adultery. But this seems hardly sound, and it is probably not law in any other state. Adultery may be committed by the contraction of a new marriage under the belief that the former husband or wife is dead, when that is not the fact; for unless the period of absence is the full term prescribed by statute for founding the presumption of death, the mere belief of it is not deemed innocent. But in such a case, if the new marriage is by law not totally void, but only voidable, the essential adultery is not committed unless the parties continue to cohabit after the passing of a decree against them; and even when a divorce regular in form has been procured, if it was invalid in fact, either because the party defendant was not within the jurisdiction or power of the court which granted it, or for any other reason, the plaintiff in the divorce suit may be guilty of adultery in contracting a new marriage.—The bill or complaint for divorce on the ground of adultery must in general allege the time and place of the commission of the act, and the name of the person with whom it was committed. The principle which requires these specifications is that the defendant is entitled to be informed with reasonable certainty of the nature of the charge made against him, so that he may have an opportunity to prepare his defence intelligently. If, however, the name of the paramour is not known to the complainant, the allegation on this point may be to the effect that the act was done with some person unknown, and this will suffice if the bill is in other respects specific enough to make the charge definite and certain on the whole. But if the allegation of adultery is based on circumstantial evidence of its commission, as for example on the fact that the defendant is infected with a venereal disease, or that a wife is found pregnant after such an absence of the husband as precludes the presumption of access on his part, the complaint or libel will be good if, besides charging adultery generally, it suggests such reasonable circumstances as fairly support the allegation.—The charge of adultery is made out by proof of a single act; but it is not necessary that the court or jury which decides upon the case should be furnished with demonstrative proof that the act was committed, or be absolutely convinced of the very time and place when or where it was committed. From the nature of the act, the evidence of it is and must be in the mass of cases only circumstantial. Sometimes the circumstantial evidence is very simple, but of a very convincing character; and sometimes the nature of the case requires the scrutiny, comparison, and interpretation of trains of circumstances which regarded separately are insufficiently criminating. As an illustration of the former sort of evidence, Lord Stowell's remark may be quoted, that "as people, according to the old saying, do not go to bawdy houses to say their paternosters, it is impossible that one can have gone to such a place for any but improper purposes;" and to have done so is universally held to be good proof of adultery. Accordingly, it has been held to be sufficient evidence of adultery, *prima facie* at least, that a man has gone to a brothel and shut himself into a room with a prostitute; and the same is true if a married woman goes to such a house with another man than her husband, or even alone. Of course, in both cases proof of innocence, or better of an innocent purpose, is admissible, though such evidence would not have much weight in most cases. The mere fact that a man and woman live together in the same house, even with the common reputation of being married, while they are not so in fact, would probably not, without other suspicious circumstances, be held sufficient proof of adultery; though it would be otherwise if the parties gave themselves out to be husband and wife. With reference to cases where the intent of the defendant is less clear, and where the approaches to the act have been less bold and open, the courts have used such language as this: that it is impossible to lay down in the form of a rule what circumstances shall or shall not constitute satisfactory proof of the fact of adultery, because the same facts may constitute such proof or not, as they are modified or influenced by different circumstances. But there must be on the whole satisfactory proof that a criminal attachment or purpose existed between the parties, and that opportunities occurred when the intercourse in which it is clear that the parties intended to indulge might have taken place. If, for example, a married woman were shown by undoubted proof to have been in an equivocal position with a man not her husband, leading to a suspicion of her adultery; if it were proved that she had shown an improper fondness for the man; if they had been detected in clandestine correspondence, had had private meetings, or made passionate declarations; if her affection had been alienated from her husband, or it appeared that her mind and heart were already depraved, and nothing was wanting but an opportunity to consummate the guilty purpose; then proof that such opportunity had occurred in connection with some or all of these other circumstances, according to the nature of the case, would lead to the satisfactory conclusion that the act had been committed. The guilty consummation, in short, may be fairly and conclusively presumed from such circumstances of conduct as, on grounds of common experience and common sense, would lead the discreet and careful judgment of a reasonable and just man to that conclusion. But, on the same principles, the conclusion may not be fairly or justly deduced, even when a witness testifies to the actual fact of adultery; for his testimony may be unworthy of credit, either because he is mistaken or because he does not speak the truth. On this ground the direct but uncorroborated evidence of two prostitutes as to the very act has been held insufficient proof of it; and on the same principle, the testimony even of the paramour of the defendant may require confirmation. Such a person, it has been said, is an accomplice, and all the legal considerations applicable to such a witness must be applied to him or her. Upon the same principles and within the same spirit of construction already suggested, acts in themselves rather innocent and indifferent may take the color of guilt from proof of other circumstances attending them. Thus the mere visit of a married woman to the lodgings of a single man has been held insufficient, alone, to establish criminality; but the act receives a different complexion when there is also proof of correspondence or other improper conduct between the parties. So, though a mere correspondence or intimacy with the alleged paramour would not be by itself sufficient, proof that there had been falsehood or concealment in respect to these things might justify the inference of guilt. Again, the difference between the higher and lower classes of society in their habits of life and social manners must be taken into the account in passing upon the behavior of parties in certain instances. For indelicate acts and demeanor, which among the vulgar may be consistent with innocence, may deserve no such favorable significance when observed among those whose breeding is finer. (See DIVORCE.) II. *The criminal offence.* Adultery, by which is here meant the mere private act, is not a crime nor indictable at common law. Before the famous adultery act of 1650, in the time of the commonwealth, there was no law in England against adultery and the kindred acts as criminal offences. This statute introduced at once the utmost severity, ordaining death for incest and adultery, and three months' imprisonment for simple fornication, and making a second offence felony without clergy. The act was repealed at the restoration, and nothing was substituted in its place. Adultery, however, has been, theoretically at least, punishable in England by virtue of unwritten law in the ecclesiastical courts, though the offence has never been pursued with any great or systematic vigor; and it may be remembered that Blackstone charges the framers of the canon law with an improper levity in respect to this sort of offences from their own aptitude to commit them. In Scotland there is still, or until very recently there was, on its statute book a law making adultery and incest capital offences. The statute, as to adultery at all events, has been long in disuse.—In many of the United States adultery is made criminal by special statutes, but in as many more it is not criminal. But though the simple act is not a crime in Ohio, Indiana, Illinois, Missouri, Louisiana, and other states, yet in many of them open and notorious adultery is criminal. The nature of the offence of adultery, created by statutes, is sometimes clearly defined by their provisions; but many of the statutes on this head simply declare the punishment of adultery, using the word as if it had a precisely ascertained meaning. In such cases it has been necessary for the courts to determine what acts were intended to be covered by the word; and upon this point has arisen an extreme diversity of opinion on account of the different views which have been taken of the policy of the law on the subject. Thus it has been sometimes said that an unmarried man's illicit intercourse with a married woman is adultery on his part, because he may impose a spurious issue upon the husband; and, upon the same ground, that a man, though married, does not commit adultery in having intercourse with an unmarried woman, because in that case there is no possibility of that result. It has also been said that when either of the parties to the act is married, though the other is not, both commit adultery. In Massachusetts the statute expressly provides that when the crime is committed between a married woman and an unmarried man, the latter shall be deemed guilty of criminal adultery, and be liable to the punishment prescribed for that offence. The statute of Minnesota is to the same effect. In the absence of such provisions, it has been held in New Jersey, for example, that in such a case the man does not commit the crime, and in Virginia that his act is only fornication. In Connecticut the statute provides that "every man and every married woman who shall commit the crime of adultery with each other shall be punished with imprisonment." The statute of Iowa declares that when the crime is committed between persons only one of whom is married, both are guilty of adultery, and shall be punished accordingly. It seems on the whole to be the prevailing and better rule, when positive enactments do not forbid it, that when one of the parties to the act is married and the other is not, it is adultery in the married one, whether man or woman, and only fornication in the other. From this rule results as the best definition that can be given of the offence, that criminal adultery is the voluntary sexual intercourse of a married person with another than the husband or wife; and this is the position taken by Mr. Bishop, the highest American authority on this and the cognate topics of the law.—Even though the single private act of adultery is not criminal or indictable at common law, yet within the principle that the general law will punish all acts which offend against public morality, adultery may take so gross and openly indecent a form as to be regarded as criminal at common law. But offences of this character are in general made the subject of special statutes. Such crimes, especially the living together in adultery, are not ordinarily regarded by the law as having been committed by mere occasional acts of private intercourse, but there must be proof of a general course of misbehavior, an habitual living or lodging together, though it is not impossible that the complete offence may be committed in a single day. In several of the states it is provided that no criminal prosecution for adultery shall be commenced except on the complaint of the husband or wife of a guilty party.

ADVANCEMENT OF SCIENCE, Associations for the. The British association for the advancement of science was formed in 1831, principally through the energy of Sir David Brewster, supported by Sir Humphry Davy, Sir John F. W. Herschel, Mr. Charles Babbage, Messrs. Forbes, Johnston, and Robison of Edinburgh, and Mr. Murchison of London. The main feature which distinguishes it is an annual gathering of its members, at which each one who has made what he supposes a real advance reads his paper for the criticism of laborers in the same department of science. The association also procures reports upon the state of each particular science, its progress, and its needs, as a guide to inquiry. The effect of the formation of this society upon the state of science in England has been very marked. The first meeting, in September, 1831, consisted of about 200 members; the second, June, 1832, numbered 700; the third, 900; and the fourth, in September, 1834, 1,390. The transactions are annually published in octavo volumes of about 500 pages, and these contain a record of nearly every important step taken in British science during the past 40 years. In the reports included in these transactions are also found the discoveries of continental and American men of science.—The American association for the advancement of science was formed in September, 1847, by the association of American geologists and naturalists. The first meeting of the new association was held in Philadelphia in September, 1848, and although the original association of geologists consisted of only 21 members, 461 names were enrolled in the first list of members of the new society, which now embraces nearly every scientific man in the United States. The 2d meeting was held at Cambridge in August, 1849; the 3d at Charleston, March, 1850; the 4th at New Haven, August, 1850; the 5th at Cincinnati, May, 1851; the 6th at Albany, August, 1851; the 7th at Cleveland, July, 1853; the 8th at Washington, April, 1854; the 9th at Providence, August, 1855; the 10th at Albany, August, 1856; the 11th at Montreal, August, 1857; the 12th at Baltimore, May, 1858; the 13th at Springfield, Mass., August, 1859; the 14th at Newport, R. I., August, 1860. The 15th was appointed for April 17, 1861, at Nashville, Tenn., but was postponed in consequence of the civil war, and after an interval of several years was finally held at Buffalo in August, 1866. The 16th was held at Burlington, Vt., in August, 1867; the 17th at Chicago, August, 1868; the 18th at Salem, Mass., August, 1869; the 19th at Troy, N. Y., August, 1870; the 20th at Indianapolis, August, 1871; the 21st at Dubuque, Iowa (substituted for San Francisco), August, 1872. The objects and methods of the association are identical with those of the British society. The proceedings of each meeting form an octavo volume of about 300 pages, and this series of volumes contains the most valuable results of American scientific inquiry during the last 25 years. The mathematical papers are not usually published in detail, but the titles of all papers offered at the meeting are published, and thus the volumes furnish at least a record of the growth of American science, a growth partly due, as it is well known, to the influence of this association. The usual number of members is about 700.

ADVENT, the period of four weeks preceding Christmas, appointed by several Christian churches to be observed in honor of the approach of the anniversary of Christ's nativity. It formerly occupied six weeks, and that is still the case in the Greek church. It commences with the Sunday nearest to St. Andrew's day (Nov. 30). In England and some parts of the European continent, marriages can be performed only by special license during this period.

ADVERTISEMENT, a public notification. Announcements in the public journals known as advertisements appeared while journalism was in its infancy. The *Acta Diurna* of the Romans, the *Gazzetta* of the Venetians, and the *affiches* of the French belong rather to the crude devices which led to the creation of journalism than to the history of advertising; while the stamping and bill-posting processes of ancient times, and the fence and rock decorations of to-day, sometimes considered in connection with advertising, are little else than ingenious sign-painting. The advertisement proper arose with periodical literature, and must be considered in connection with its development. The first regular newspaper, "The Certain Newes of this Present Week," published in England in 1622, did not contain any advertisements; but they appeared in something like a resemblance to the present form in 1652, in a paper called the "Mercurius Politicus." It needed but a short time to popularize the idea, and those notices which are still called "hue and cry advertisements"—for thieves and runaway apprentices—soon became prominent features in the papers. Books were the earliest articles advertised, and were followed by groceries—tea (or, as it was then called, "tcha") being the first article of merchandise announced. By 1688 England had added a sufficient number of newspapers to her meagre list to cause advertisements, especially those of popular amusements, to be eagerly looked for. The plague brought the first medical advertisements. Under William and Mary a gratuitous journal was started devoted solely to advertisements. It lived but two years. A similar enterprise a few years afterward succeeded. In 1700 advertising had become very general, and in 1710 we find Addison reviewing the advertisements of his time, "printed with little cuts and figures"—this being the first we hear of pictorial advertisements. In 1800 a crude system of classifying and arranging advertisements was adopted. The further progress of advertising up to the time when the enterprise of the United States pushed it onward may be followed out in the history of the London "Times," which was established in 1788. The "Times" did little to reduce advertising to a system, but it demonstrated its value to the public, and its importance in the economy of newspapers. In 1865 a single number is said to have contained 2,575 advertisements, and other numbers are cited containing still more.—The first printing press was brought to America in 1639. In 1704 the first regular newspaper, "The Boston News Letter," was established. This was often without a single advertisement, and had been published 40 years before its circulation reached 300. It needed 15 years after the establishment of the first paper to add a second and third. With the increase of shipping interests newspapers appeared in larger numbers, and advertisements began to multiply. In 1725 the first newspaper in New York, the "Gazette," was commenced; and in 1728 Philadelphia founded the journal which at its 40th number passed into the hands of Benjamin Franklin. At this time the country contained but seven newspapers. In 1775 there were 34. Then came the war of independence, which put journalism back again; but after its close the country steadily advanced in periodical literature. In 1787 the first daily journal, the "Independent Gazette," was commenced in New York, and in the following year (the same in which the London "Times" was established) it contained 34 advertisements. It seems from these facts that England and America made advertising a serious business more nearly at the same time than is usually supposed. England had largely the advantage, however, in population and in developed resources. Some of the larger tradesmen in London soon learned that those who advertised most liberally received the most custom. Competition among dealers created a large advertising business, which certain special advertisers carried so far as to astonish the world, until the growth of American advertising enterprise developed the fact that heavy advertising was not so much a bold as a strictly legitimate operation on the part of business men. Various food and medicinal preparations and many fancy articles were advertised in England until the yearly amounts paid the newspapers on account of a single article sometimes reached $100,000 to $150,000. Cuts became almost innumerable, and, with crests and monograms, appeared in every paper which would admit them. The advance of journalism in America can, up to a certain time, be best given in its statistics, it being understood that advertising fully kept pace with it and to a considerable extent made it possible. In 1794 the "Commercial Advertiser" was commenced in New York, and in 1801 the "Evening Post." Both journals had considerable influence and grew rapidly. The year 1810 found 32 papers in the state of Massachusetts, and 10 years afterward there were 690 in the United States. In 1830 there were 1,000, and in 1840, 1,401. The New York "Sun," founded in 1833, the "Herald," in 1835, and the "Tribune," in 1841, had introduced some new ideas, which not only enlarged the power and influence of journalism, but greatly popularized advertising. Transient advertising was encouraged, it being discovered that a regular run of small advertisements, at fair rates, continued the year round, paid better than contracts for the same space devoted to long advertisements at low rates, and which lasted only during the business season. A variety in the classes of advertisements was also introduced, and is almost peculiar to American newspapers. For instance, the advertiser could insert, if he chose, amusing "reading" or "local" notices, in which matters interesting the public mind were ingeniously joined with the goods for sale. "Business Notices" and "Special Notices" are other varieties of early adoption, for which higher prices are obtained than for the ordinary advertisement. In 1860 the United States contained the surprising number of 5,253 newspapers. The art of advertising was growing into something like system. Expedients of all kinds were used. Odd and startling cuts were adopted in spite of the newspaper rule (not always enforced) of double prices for such figures; while the old-fashioned, simple style of advertising grew to very large proportions, and enabled almost every village in the country to have its newspaper. As the business became so extensive and the territory to be covered so large, advertising agencies became necessary. These exist to-day in England and continental Europe, but have by no means the importance which from the nature of the case they have attained in the United States. A few large houses—one of which situated in New York has transactions to the amount of nearly one million dollars per annum—do most of the agency business. It requires a high reputation for responsibility either to obtain the advertising or secure favorable contracts with the newspapers. The method pursued by the better class of agents is simple in principle, but the details require great labor and attention. The largest house in the United States employs about 40 men permanently, and occupies one of the best offices in New York. It has its own printing establishment, and keeps files of nearly 6,000 periodicals. The advertiser gives in his "copy," chooses the papers in which it is to appear, and receives an estimate of the cost. The copy is printed, forwarded to publishers, and inserted in the space contracted for. The agent receives his commission entirely from the paper, though it will be understood that he saves the advertiser large sums in postage or travelling expenses and much time and trouble. The papers, as fast as returned with the advertisements, are entered, checked, and verified, after which they are filed away for the inspection of the advertiser if he desires to examine them. The first advertising agency in America was established in 1828 by Mr. Orlando Bourne, and was followed in 1840 by the founding of similar agencies in Philadelphia, Boston, and New York, by Mr. V. B. Palmer. It was not until about 1860 that anything like full lists of newspapers appeared and the business was systematized. A complete "American Newspaper Directory" is now published by a New York advertising agency, and annually revised; and the same firm publish a weekly "Newspaper Reporter," which fully records the occurrences in the newspaper and advertising world.—The number of large cities in the United States having a powerful and thoroughly organized press would naturally give rise to the supposition that advertising was cheaper here than in England, where the very large papers are few in number. But such is not the case. "Harper's Weekly," for example, considered an important medium for "scattered" advertising, receives from $1.50 to $2.50 per line, and "Frank Leslie's Illustrated Newspaper" from $1 to $1.50. The "New York Weekly Tribune" receives from $2 to $5 per line, the latter price being for notices inserted among the news. The "New York Weekly," a story paper, receives $3 per line. The "Fireside Companion," "Harper's Bazar," "The Scientific American," and others, charge $1 per line, although the last-named paper, to protect its smaller advertisers against being overshadowed, has adopted the peculiar rule of charging 25 cents per line additional for advertisements over four lines in a certain part of the sheet devoted to this purpose. The larger dailies in New York receive from 20 to 40 cents per line for ordinary advertisements, and $1 to $2.50 per line for notices inserted among the general reading matter.—The amounts expended by certain advertisers, though often exaggerated, have been very large. Ten years ago, when boldness was less a habit than to-day, $150,000 was spent by one firm in New York for a year's advertising. Since that time the same sum has been expended repeatedly. A patent medicine dealer in New York has several times advertised to the extent of $250,000 a year. To advertise to the amount of $100,000 a year now excites little surprise in the United States, and many names might be given of those who do not use less than $50,000 or $25,000 for their yearly advertising. Some of the larger incorporated companies are also heavy advertisers. This is a peculiar feature in this country, as most of these interests are advertised in Europe by a brief card, if at all. The "Union Pacific Railway Company," and also the "Northern Pacific," are stated to have advertised to the extent of between $400,000 and $500,000 in a little over two years. Insurance companies expend large amounts in this way, and banking houses, brokers, and those connected with shipping interests, all find advertising advantageous. Nor are their advertisements confined to any single class of newspapers. When Jay Cooke advertised the bonds of the United States, his announcements were seen throughout the country. The banker's orders to his manager were, "Give the advertisement to all those newspapers that are alive enough to apply for it." The faith of Americans in advertising may best be shown in the fact that newspaper publishers and the largest advertising agents are often liberal advertisers. The sum of $3,500 has been paid by "The Sun" for an advertisement in one number of a publication. The weekly paper which is supposed to have the largest circulation in the country, the "New York Ledger," gained it almost exclusively by advertising. In 1867 the government tax was collected on nearly $10,000,000 worth of advertisements. New York state paid nearly $100,000 tax, at 3 per cent. (of which the city alone paid over $80,000), Philadelphia $30,000, Boston $23,000, Cincinnati $16,000, Chicago $15,000, and New Orleans and St. Louis each over $13,000. In the five years 1867–'72 the amount paid by the public for their advertising must have reached $15,000,000 annually. The use of pictures in the advertising columns of newspapers is gaining constantly in popularity, and less and less resistance is made to it by publishers. Of the 150 religious newspapers, most of which refused cuts two or three years ago, all but 16 now accept them.

ADVOCATE. See Lawyer.

ADVOCATUS DIABOLI, in the Catholic church, the speaker or writer who shows cause against the canonization of a person proposed for sainthood. The advocate who defends the proposed saint is called *advocatus Dei.* The *advocatus diaboli* insists upon the weak points of the good man's or woman's life. Hence the name is sometimes popularly applied to those who detract from the characters of good men.

ADVOWSON, in English law, the right of presenting to a vacant living in the church. Advowson, according to Blackstone, signifies taking into protection or patronage. When the lord of a manor built a church and endowed it, he acquired a right of nominating the ministers, provided they were canonically qualified. Advowsons are property, and as such purchasable, provided that certain laws for the prevention of simony are not infringed in the purchase. These laws are, however, more frequently evaded than obeyed. The most ordinary form of advowson is the presentation of a duly qualified clergyman to the bishop for institution into the living. The bishop has the right to reject the candidate presented; but in a few rare cases the patron has a right of presenting a person without the bishop's interference. The benefices of the church of England are in every case subjects of presentation. They are nearly 12,000 in number; the advowson of more than half of them belongs to private persons, and of the remainder to the crown, bishops, deans and chapters, universities, and colleges. The incumbents are maintained by tithes, or since the tithes commutation act by taxes in lieu of tithes. The elective right of the congregation is unknown in the church of England, except in regard to those clergymen who perform duties in excess of the regular duties of the rector or vicar; such for instance as lecturers, who are paid by voluntary contributions.

ÆACUS, in Greek mythology, son of Jupiter and Ægina, and first king of the island of Ægina. He was renowned for his justice, so that he was called upon to settle disputes not only among men, but even among the gods. His reputation was such that, on the occasion of an excessive drought in Greece, he was appointed by the oracle of Delphi to intercede with the gods for rain, and his prayers were successful. After his death, Pluto made him one of the three judges of Hades.

ÆDILES (Lat. *ædes*, a building, temple), Roman magistrates charged with the supervision of public buildings, archives, streets, roads, aqueducts, markets, baths, eating houses, places of amusement, and public games; with the regulation of prices of provisions, and of weights and measures; with the sanitary superintendence, and various other functions of a similar character. The ædiles were originally of the plebeian order, and served as assistants to the tribunes of the people. Subsequently they became independent magistrates. In the earlier part of the 4th century B. C. two patrician ædiles were added, who enjoyed the double privilege of wearing the *toga prætexta* and sitting on curule chairs (*ædiles curules*). These privileges were soon after extended to their plebeian colleagues. In the latter periods of the republic the office of ædile became an object of great ambition to wealthy politicians, who sought to win the favor of the multitude by lavish expenditures on the public games.

ÆDUI, or **Hedui,** a powerful people of Celtic Gaul, between the Saône and the upper Loire, which rivers separated their territory from the countries of the Sequani and Bituriges. They were the first Gallic tribes which concluded an alliance with the Romans, and having, after a struggle with the Sequani, fallen under the power of Ariovistus, the German ally of the latter, were restored to power by Julius Cæsar, shortly after the opening of his Gallic campaigns (58 B. C.). They joined, however, in the great rising against that conqueror under Vercingetorix (52), on whose fall they were leniently treated by the victor. Their chief town was Bibracte, subsequently called Augustodunum, now Autun, in Burgundy.

ÆGÆON. See Briareus.

ÆGÆUS, a legendary king of Athens, father of Theseus. Misled by a false signal to believe that his son had been killed in a contest with the Minotaur, he cast himself into the sea, which, according to some, was called after him the Ægean.

ÆGEAN SEA. See Archipelago.

ÆGINA, or **Egina** (Turk. *Engia*), a Greek island in the Saronic gulf (now gulf of Ægina), 12 m. S. S. W. of the Piræus, about 9 m. long from N. E. to S. W., and about 7 m. wide. Its western side consists of stony but fertile plains, which are well cultivated and produce luxuriant crops. The rest of the island is mountainous. The climate is the most healthy in Greece. From its hills a magnificent prospect unfolds itself. Its chief interest depends on its past history and its antiquities, it having been one of the most celebrated islands of Greece, both in the mythological and historical periods, and also in the sphere of art. It was a Dorian settlement, and was one of the first places in Greece noted for its maritime ascendancy. As early as 563 B. C. Ægina had a factory in Egypt. It was a great rendezvous for pirates and slave traders, fugitive criminals and insolvent debtors. The people of Ægina, with their contingent of 30 ships, played a brilliant part in the great sea fight off Salamis. Its earliest enemy was Athens, which state eventually, in 429 B. C., took possession of the island and expelled its inhabitants. Ægina, though often mentioned in the Greek authors, never recovered any political or commercial importance. Sulpicius, in one of his letters to Cicero, in which he alludes to a cruise in the Saronic gulf, speaks of Ægina as a monument of departed greatness. Its chief temple was that of Zeus Panhellenius, or, in the opinion of some archæologists, that of Minerva, mentioned by Herodotus. Cicero speaks of it as in ruins. In 1811 a company of German and British scholars cleared away the rubbish which had accumulated in the course of 2,000 years at the base of the temple, and after 20 days' excavating were rewarded by the discovery of 16 statues of an early type of Greek sculpture. These statues are now in the Glyptothek of Munich, and have been restored by Thorwaldsen. The subject is supposed to be the expedition of the Æacidæ or Æginetan heroes against Troy, under the guidance of Minerva. The present population of the island is about 6,000, and that of its chief town, of the same name, on the W. side, near the ruins of the ancient town, 3,000. The products are wine, oil, fruits, and grain. The Ægina almonds are the best in Greece. The water works on the neighboring Mount Elias, famous for its magnificent views, save the island from drought. A bishop resides on the island, and schools and churches abound. Since the decay of the Byzantine empire, Ægina has been successively in the hands of the Venetians, Turks, and Greeks. Under Capodistria it was from 1828 to 1831 the seat of the government. Edmond About has published *L'Ile d'Égine* (1854).

ÆGIS (Gr. αἴξ, she goat), the appellation of the shield of Jupiter, which was covered with the skin of the goat Amalthea, by which that god was nourished in infancy. Minerva also bore an ægis, which, at least according to post-Homeric mythology, was of different origin.

ÆGISTHUS, king of Mycenæ, son of Thyestes and cousin to Agamemnon. He formed an adulterous connection with Agamemnon's wife Clytemnestra during his absence at Troy, and contrived his murder on his return. Eight years later he was slain by Orestes, the son of Agamemnon. Writers later than Homer tell a frightful story of incest and crime about Ægisthus and his family. (See ATREUS.)

ÆLIA CAPITOLINA, a name given to Jerusalem by the emperor Hadrian (Ælius Hadrianus), who, after a rebellion of the Jews in his reign, drove them from the destroyed city and its environs, and repeopled it with Roman colonists. It went by this title until the time of the Christian emperors.

ÆLIANUS, Claudius, a writer of the early part of the 3d century, born at Præneste in Italy. His compilation, generally known under the Latin title *Varia Historia*, is still extant, as well as an original treatise *De Animalium Natura*. These works are written in Greek, of which the author, though an Italian by birth, was a perfect master.

AELST, or **Aalst**, a town of Belgium. See ALOST.

AELST, or **Aalst**. **I. Evert van**, a Dutch painter, born in Delft in 1602, died in 1658. He was distinguished for painting flowers, dead birds, and game, and other inanimate objects. Few of his works are to be found in picture galleries. **II. Willem van**, nephew and pupil of the preceding, born in Delft in 1620, died in Amsterdam in 1679. His works in the same line were more admired than those of his uncle, and are to be found in the galleries of Berlin, Munich, and Dresden, as well as in France and Italy, in which countries he spent many years, particularly in Florence. In the coloring, finish, delicacy, and naturalness of his flowers and fruits painted on vases, he had no superior.

ÆMILIUS PAULUS. I. See PAULUS, L. ÆMILIUS. **II.** (PAOLO EMILIO), an Italian historian, born in Verona, died in Paris, May 5, 1529. In consequence of his celebrity as a writer in Italy, Louis XII. made him a canon of the cathedral of Paris, and employed him to write a history of the kings of France in Latin.

ÆNEAS, son of Anchises and Venus, a Trojan prince, with whom tradition connects the origin of the Roman empire. Having fought for Troy till it fell, he quitted the burning city with his followers, accompanied by his father and son. After visiting various countries, they landed on the shores of Latium, where they met with a friendly reception from King Latinus. They settled there, and soon became involved in hostilities with the people of the country, in the course of which Latinus was slain. Æneas was finally victorious. He married Lavinia, the daughter of Latinus. His son by Creüsa, Ascanius or Iulus, founded Alba Longa, one of the last kings of which, Numitor, was the grandfather of Romulus and Remus, the founders of Rome. Æneas is the hero of Virgil's Æneid.

ÆNEAS SYLVIUS. See PIUS II. (pope).

ÆNEID. See VIRGIL.

ÆNIANES, an ancient tribe of upper Greece, of remote and uncertain origin, whose frequent migrations in early times are spoken of by many writers of antiquity, especially by Plutarch, in his "Greek Questions." According to this author, they occupied in the first instance the Dotian plains, on the confines of Thessaly and Macedonia, moved thence into Epirus, and in their last migration went from Crissa, on the gulf of the same name, to the valley of the northern Inachus, on which they finally settled. Their chief town was Hypata, at the foot of Mt. Œta, of which considerable remains exist at the village of Neopatra. The antiquity and early importance of this people are attested by the fact of their belonging to the Amphictyonic council. At a later period they joined the confederation of the other Hellenic states against Macedonia, which gave rise to the Lamian war; but according to Strabo, in his time they had no longer a national existence, having been nearly exterminated by the Ætolians and Athamanians.

ÆOLIAN HARP, a musical instrument, the tones of which are produced by the sweeping of the wind over its strings. Its invention is ascribed to Athanasius Kircher. It is composed of a rectangular box made of very thin boards, about 5 inches deep and 6 inches wide, and long enough to fit across the window in which it is to be placed. At the top of each end of the box is glued a strip of wood about half an inch in height; these strips serve as a bridge for the strings, which are stretched lengthwise across the top of the box, and are made of catgut or wire. These strings should be tuned in unison by means of pegs constructed to control their tension, as in the violin. When the instrument is exposed in a window partly open, so as to allow a current of air to pass over the strings, a most agreeable combination of tones is produced, constantly varying in pitch and intensity with the force of the wind, and forming harmonies of a wild and melancholy character.

Æolian Harp.

ÆOLIAN ISLES. See Lipari Islands.

ÆOLIANS, the name of one of the primitive divisions of the Hellenic race. They are said to have dwelt originally in the S. W. part of the plain of Thessaly, and thence to have spread over other regions of Greece, and after the Doric invasion of the Peloponnesus to have occupied the N. W. coast region of Asia Minor, from them called Æolis, and the islands of Lesbos and Tenedos. Of the Æolic dialect of the Greek, which was chiefly developed in Lesbos, only scanty specimens have been preserved; these bring it nearer to the Doric than the Attic. Mythologically, the Æolians were descended from Æolus, the son of Hellen.

ÆOLIPYLE, or **Æolipile** (Αἰόλου-πύλαι, the gate of Æolus; or, more probably, *Æolipila*, the ball of Æolus), a hollow metallic ball, containing a curved tube connected with a small orifice, and sometimes two such tubes turning in opposite directions. Water or alcohol being introduced in it and boiled, it was used in old times to exemplify the force of steam, or as a blowpipe when adjusted to a lamp. In 1615 Salomon de Caus noticed in using it the effect of steam in causing water, by the assistance of heat, to mount above its level. This machine was intended to discover the cause of the winds.

ÆOLIS, in ancient geography, a district in Asia Minor, originally settled by colonies of Æolian Greeks. It was properly the coast land of Mysia, extending from Troas to the south bank of the river Hermus. In its broadest signification it included Troas to the shores of the Hellespont. In the southern part were situated the twelve cities which formed the Æolian league. Of these, Cyme, where the annual Panæolium was celebrated, and Smyrna, which in later times became a member of the Ionian confederation, were the most celebrated.

ÆOLUS. I. In Greek mythological history, a son of Hellen, who, in the division by the latter of the government of the Hellenes or Greeks between him and his brothers Dorus and Xuthus, received the throne of Thessaly and named his subjects the Æolians. He was the progenitor of a great race of heroes, the Æolids, from whom in turn sprang many of the most famous personages of the Greek legends. Other genealogies were also given by the Greeks to Æolus, but the above, that of the Hesiodic catalogue, is that which Grote believes to have been generally received. **II.** An inferior god or demigod, ruler of the winds. There seems no good reason to connect this Æolus with the preceding, but a few Greek authors endeavored to prove even the identity of the two, while others made the demigod the son of Jupiter and Acasta, daughter of Hippotas. Æolus was supposed to have his home in the island now called Stromboli, of the Lipari group, anciently known as the Æolian islands. According to tradition, he kept the several winds confined in bags, releasing them at the command of Neptune.

ÆON, a Greek term signifying age. In Gnostic speculations, æons are embodiments of divine attributes. (See Gnostics.)

ÆPINUS. I. Johann (the Greek translation of his real name, *Hoch* or *Höck*, high), a German theologian, born at Ziegesar, Brandenburg, in 1499, died in Hamburg, May 13, 1553. He studied at Wittenberg, was arrested on account of his zeal for the cause of Luther, and exerted himself after his release in England and Germany on behalf of the reformation. He was afterward for some time teacher at Stralsund, and organized the new educational and ecclesiastical system there, and in Hamburg (1522), in which latter city he was pastor, and afterward superintendent of St. Peter's church from 1529 till his death. He was one of the signers of the Smalcald articles in 1537, shared in the theological controversies regarding the Interim, the Adiaphora, and the doctrines of Osiander, and was supported by Flacius and others, and to a moderate extent also by Melanchthon. **II. Franz Ulrich Theodor,** a German physicist, a descendant of the preceding, born at Rostock in December, 1724, died in Dorpat in 1802. He became professor of physics and member of the academy of sciences at St. Petersburg in 1757. Catharine II. appointed him teacher of her son Paul, director of the nobility corps of cadets, and inspector general of the normal schools which she projected. He is honored as the inventor of the electrophus and of electric condensation, an improver of the microscope, and the discoverer of the electrical polarity of tourmaline. He contributed extensively to the publications of the Berlin and St. Petersburg academies. His principal work is *Tentamen Theoriæ Electricitatis et Magnetismi* (St. Petersburg, 1759; French translation, abridged by Haüy, 1787). One of his other works, written in German, was translated in 1762 into French by M. Raoult, under the title of *Réflexions sur la* *distribution de la chaleur sur la surface de la terre.* He wrote in French *Description des nouveaux microscopes inventés par M. Æpinus* (St. Petersburg, 1786).

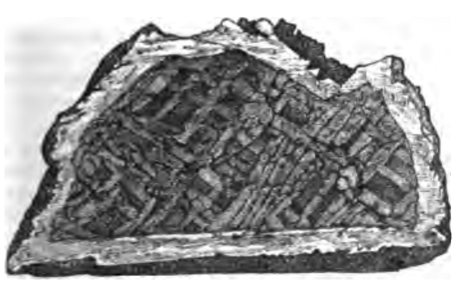
ÆQUI, also called **Æquicoli** and **Æquiculani,** an ancient warlike people of central Italy, dwelling in the mountainous region of N. E. Latium, between Lake Fucinus (Lago di Celano) and the Anio (Teverone), surrounded by the Sabines, Marsi, Hernici, and Latins. They were among the most obstinate enemies of the early Romans, fighting them chiefly in alliance with the Volsci, a kindred people, and together with the latter were badly defeated by Camillus in 389 B. C. They suffered still more crushing defeats shortly before the close of the same century, when they were finally subdued. Mount Algidus, in the western part of their territory, was one of their natural strongholds, from which they made their incursions into the country around Rome.

AËRIANS, a semi-Arian sect of the 4th century, named from Aërius, a monk of Pontus, and holding middle ground between the Arians and the Nicæans. The Nicæans were Homoousians, and the high Arians were Heterousians, while the Aërians were Homoiousians. The Aërians in church government denied the distinction between a bishop and a presbyter. They were opposed by a small counter faction called Aëtians. (See Aëtius.)

AERÖE, or **Arröe,** an island belonging to Denmark, in the Baltic, at the E. side of the entrance to the Little Belt, 10 m. S. of Fünen; pop. 12,400. It is about 10 m. long by 5 broad, and is fertile and well cultivated. The capital, Aeröeskjöbing, on the E. coast, has considerable shipping; pop. 1,700.

AËROKLINOSCOPE, an instrument recently introduced on the continent of Europe, in connection with the weather signal departments. It is intended to give public information of the condition or rather differences of barometric pressure at the different stations, so that every one at a glance may see in what quarter the maximum and minimum barometric pressure is, and consequently what direction of wind and what kind of weather are to be expected. The apparatus as now in practical use consists of a vertical axis some 30 feet high, turning on a pivot, and carrying on its top a horizontal arm of which the inclination can be varied according to the difference of barometrical pressure at different sides of the station. If the pressure is the same north and south, for instance, the horizontal arm is placed horizontal; but if the pressure is less in the north, the northern end of the arm is caused to dip downward, and more so in proportion as the barometer is lower north as compared with its position south. The amount of dip is regulated by a sliding rod, held in position by different notches at the lower part of the axis, each notch corresponding with one millimetre in barometric pressure. This most useful apparatus is the invention of Buys-Ballot in Holland. The government of the Netherlands introduced storm signals there in 1860; England followed in 1861, and France in 1863.

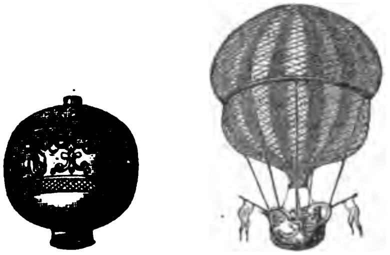
AËROLITE (Gr. ἀήρ, air, and λίθος, stone), a stone or mineral mass of ultra-terrestrial origin which has fallen to the earth. The different bodies constituting our planetary system vary considerably in size. Jupiter, the largest, has in round numbers a diameter of 80,000 miles, while Clio, the smallest of the so-called asteroids thus far known, has a diameter of scarcely 16 miles, and is thus 125,000,000 times smaller in bulk. There is no ground whatsoever to assert that Clio is the smallest body which revolves around the sun; most likely there are bodies as much smaller than Clio as the latter is smaller than Jupiter. Such bodies would have a diameter of scarcely 16 feet; and if we descend another step in the same ratio, we come to bodies of a diameter of 1/16 of an inch, constituting mere dust. Such bodies may revolve in myriads in the planetary space, without our ever being able to obtain any knowledge of their existence, except where they come so near to our planet as to be acted on by its gravitation and drawn to its surface. It has been proved by the statistics of observation that every year 600 or 700 meteoric showers take place over the surface of our earth, bringing down at least 5,000 separate aërolites; the unequal distribution over different portions of the earth's surface is only apparent, as the two zones in America and Europe in which, according to Prof. Shepard the greatest numbers of meteoric showers have been observed, are simply those zones which are the most thickly peopled, and where the press and telegraph diffuse rapidly every observation. Sometimes one or two single masses fall, and sometimes a shower of 2,000, 3,000, or more stones is distributed over a surface of several acres or even miles; sometimes dust accompanies the shower, and sometimes dust falls alone. The theory here propounded is due to Chladni, who toward the end of the last century defended the idea originated by Kepler, that there were more comets and smaller bodies flying about in space than fishes in the ocean. Before Chladni's time the most absurd ideas prevailed in regard to the origin of aërolites. Some supposed that they were formed in the upper strata of our atmosphere by the condensation of vapors of solids, as hailstones are formed by the condensation and congelation of watery vapors. Laplace sought their origin at a greater distance, and concluded that as gravitation on the moon is about four times less than it is on the earth, it might be possible that the volcanoes there project stones with such force as to go beyond the limits of lunar attraction, and to reach that of the earth; and indeed a velocity two or three times greater than that which we are able to give to a cannon ball would accomplish this result. These theories prevailed for a time, although chemists proved that aërolites are not of volcanic origin, and astronomers proved that their velocity in approaching the earth is far too great to be accounted for by terrestrial attraction. Mechanical science indeed proves that a body falling from an infinite distance will arrive at the earth with a velocity of only 6 to 7 miles per second, while aërolites pass tangentially through our atmosphere with more than double or triple that rate, in fact, with a planetary velocity; some of them even overtake the earth in its course, as is the case with those falling about sunset. By the combined rotation and revolution of the terrestrial globe, that portion of the earth where it is sunset moves from its zenith, while that portion where it is sunrise moves toward its zenith, or at least toward that portion of the zodiac nearest to its zenith, and thus has more chance of coming in contact with isolated flying masses; this accounts for the fact that the greatest number of aërolites fall in the forenoon. Of the cases recorded in history, the most remarkable are as follows: An aërolite is mentioned by Pliny, which fell in 467 B. C. in Thrace, and was still extant in his time; he states that it had the size of a wagon. The Chinese chronicle a large aërolite which fell during a thunderstorm long before our era. The *Annales Fuldenses* report a great shower of aërolites in Saxony in 823, by which men and cattle were killed and 35 villages were set on fire. Among the other cases, the most remarkable are the falls of aërolites in 921, 1010, 1164, and 1304, all in Europe. In Alsace there fell in 1492 an aërolite of 260 lbs., which is still preserved in the church of Ensisheim. In Crema a shower of many hundreds of stones took place Sept. 14, 1511; 1,200 pieces were collected, of which one weighed 260 lbs., and another 120 lbs. Records of later date become more and more complete and authentic, and all doubts in regard to the accuracy of their statements, existing till the end of the last century, were removed when, on April 26, 1803, at Aigle in France, a small immovable cloud was seen, out of which, during explosions lasting five to six minutes, a number of stones fell on a surface two miles long. The largest weighed 20 lbs., the smallest ¼ ounce. On March 13, 1807, an aërolite of 140 lbs. fell in Smolensk, Russia; and on May 22, 1808, at Stannern in Moravia, between 200 and 300 stones fell, from half an ounce to 11 lbs. in weight. An American vessel 240 miles S. of Java experienced on Nov. 14, 1856, a shower of stones of the size of shot, which were afterward proved not to be the product of the eruption of a distant volcano, carried along with the winds, as at first suggested, but of true cosmical origin—a question easily settled by the microscope and chemical analysis, as will be seen later. Klein published in his *Sonnensystem* (Brunswick, 1869) a record of more than 300 well authenticated cases, of which 3 were in the 15th century, 15 in the 16th, 23 in the 17th, 40 in the 18th, and 216 in the first 69 years of the 19th century. It is certain that such falls were just as frequent in former centuries as they are now, only the records are lacking. In regard to the ancient geological eras, there is no doubt that the falls of meteoric masses were even more frequent; it is highly probable even that a portion of the earth's and moon's mass is largely made up of such aërolites, which are not now found in the lower strata of the earth for the simple reason that they are very oxidizable, and have been disintegrated by air and water and mixed with the original terrestrial matter, by the immense changes through which our earth's crust has passed; they may therefore exist in a better state of preservation on the moon's surface. Olbers supposes that the earth has during countless ages hollowed out for itself a kind of comparatively empty rut among those flying aërolites, attracting all within the reach of its gravitation, and that now, by the periodical inequalities and perturbations of its orbit, it occasionally appropriates some masses which had before escaped its attractive power, or that the earth occasionally comes in the neighborhood of masses having an orbit which intersects its own. (See METEOR.) In regard to the sizes, the largest masses on record were heard of by Capt. Ross in 1818, when the Esquimaux of Baffin bay informed him of their existence on the W. coast of Greenland. They were found in 1870 by the Swedish Arctic expedition, which brought some of them to Stockholm, where they excited so much interest that in 1871 20 more specimens were collected, now in the royal academy of Stockholm, the largest weighing 25 tons, with a maximum sectional area of 42 square feet. The next in size weighs 10 tons, and has been presented to the museum of Copenhagen. In Mexico and Brazil similar masses have been found. The British museum possesses one of more than five tons. In the museum in St. Petersburg is a mass of 1,680 lbs. found in Siberia in 1772. Yale college, New Haven, possesses, among more than 100 specimens, one aërolite of 1,635 lbs., which fell in Texas in 1808. The Smithsonian institution possesses a very remarkable annular specimen discovered about 1700 in Mexico, which, according to an Indian tradition, fell there about 200 years before during a shower of stones; its weight is 1,400 lbs. Aërolites of a weight of 200 to 400 lbs. are not uncommon in collections, and those of 100 lbs. and less are very common.—In regard to the chemical composition of these stones, it must be observed that in passing through our atmosphere they undergo some change, as they always take fire in the upper regions, and arrive at the ground quite hot, sometimes making a deep hole. Combustible substances in their composition, and perhaps an atmosphere of combustible gases surrounding them, combined with the immense velocity with which they enter our atmosphere, cause on the sudden diminution of that motion a most intense rise of temperature, ignition, and very often one or more exceedingly violent explosions. It is therefore not surprising that they all present the appearance of having been subjected to great heat. Chemical analysis has shown that there are two principal kinds, the stony and the metallic aërolites, which by further investigation have been divided into several groups, in accordance with the elements contained and the character of their combinations. Stony aërolites resemble the peridot, a universal scoria from the earth's deep interior, underlying the aluminous basic rocks, the granite and gneiss; the latter, being stratified rocks, are never found among aërolites. The specific gravity of stony aërolites is 3·5 to 3·8, while that of stratified formations, gneiss and granite, and of lava, is only 2·6 to 2·9. Metallic aërolites have a specific gravity of from 6·5 to 8, and consist chiefly of iron, always combined with nickel, usually containing 60 per cent. or more of iron and 5 to 25 of nickel, a compound never found on earth; the other elements are chiefly phosphorus, silicon, aluminum, cobalt, and manganese. Other substances which have been found in different specimens are: magnesium, titanium, tin, copper, chromium, arsenic, calcium, potassium, sodium, sulphur, carbon, chlorine, nitrogen, and hydrogen in occlusion (see ABSORPTION OF GASES BY SOLIDS), making 22 elements, one third of those of which the earth is composed. Some aërolites are of a mixed stony and metallic character, but they are never homogeneous; even the metallic ones, which appear to be an alloy, are very heterogeneous. This is manifested by grinding and polishing a face and then acting on it with nitric acid, when some portions will dissolve, and more resistant small crystals will become prominent, showing a decided crystalline structure. The figures thus formed are called, after their discoverer, Widmannstaett's figures, and they may be made so prominent as to allow the surface to be used as an engraved plate and printed. Our figure represents an aërolite found in Wisconsin, preserved in the cabinet of I. A. Lapham of Milwaukee, and engraved after the photograph of a section prepared by Dr. J. Lawrence Smith, showing the Widmannstaettian figures.—The idea suggested by Sir William Thomson before the British association for the advancement of science in 1871, that the existence of vegetable and animal life on our planet may be accounted for by aërolites having brought the first organized germs hither, substitutes for the difficult question as to the terrestrial origin of organisms, the still more perplexing one of how they originated on the aërolites.—See further Phipson's "Treatise on Meteors, Aërolites, and Falling Stars" (London, 1866); Daubrée, *Rapport sur les progrès de la géologie expérimentale* (Paris, 1867). The latter is very exhaustive, and contains accounts of experiments in imitating the different kinds of aërolites.



Widmannstaett's Figures.

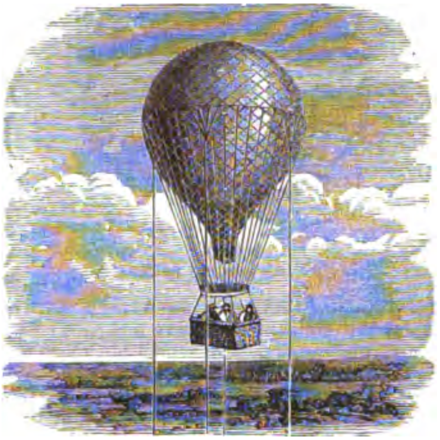
AËROMETER (Gr. ἀήρ, air, and μέτρον, measure), an instrument invented by Dr. Marcus Hunt for ascertaining the mean bulk of gases and the density or rarity of air. It is now little used, and the whole doctrine of air, considered as a fluid, its pressure, elasticity, rarefaction, and condensation, belongs in that department of natural philosophy termed pneumatics.

AËRONAUTICS (Gr. ἀήρ, air, and ναυτικός, of or belonging to ships), or **Aerostation** (Gr. ἀήρ, and στάσις, standing), the art of sailing in and navigating the air, and of raising and sustaining substances by means of gases specifically lighter than the atmosphere, contained in a spheroidal bag called a balloon. The former term is the more comprehensive of the two, and includes the whole science of aërial navigation, while the latter is generally confined to ballooning. The myths of Dædalus and Icarus show that the attempts of man to soar above the earth commenced in prehistoric times. Flying machines were expected to effect this object. Archytas of Tarentum is said to have manufactured, 400 years B. C., a wooden pigeon which sustained itself in the air a few minutes. Simon Magus, according to Suetonius, met his death in Rome in the reign of the emperor Nero in an attempt to fly from one house to another. Roger Bacon had some notion of a flying machine to be propelled by a system of wings; and in the latter part of the 15th century Dante, a mathematician of Perugia, rose above Lake Thrasimene by means of artificial wings attached to his body. Many similar attempts have been made since then by persons imperfectly acquainted with the principles of mechanical philosophy, which have invariably resulted in failure, and the problem is as far from solution as ever. The discovery of the properties of hydrogen gas by Cavendish in 1766 gave the first hint of a practical method of aërial navigation. This is the lightest of the gases, being a little more than 14 times rarer than atmospheric air; and as early as 1767 Professor Black of Edinburgh announced to his class that a vessel filled with it would naturally rise into the air. A few years later (1782) Cavallo made a series of experiments on the subject, but did not succeed in raising anything heavier than a soap bubble. The honor of preparing and sending up the first balloon belongs to the brothers Stephen and Joseph Montgolfier, paper manufacturers at Annonay, near Lyons, who, however, at the outset of their experiments, knew nothing of hydrogen gas, and employed heated air to inflate their machine, without apparently being aware of its superior buoyancy to the atmosphere. Their balloon was constructed of linen cloth lined with paper, under which a fire was kindled, fed with bundles of chopped straw. By this means dense volumes of smoke were produced, which filled the balloon; and it would seem that they actually expected the latter to be raised by the ascending power of the smoke, instead of its true cause, the rarefaction of the heated air.



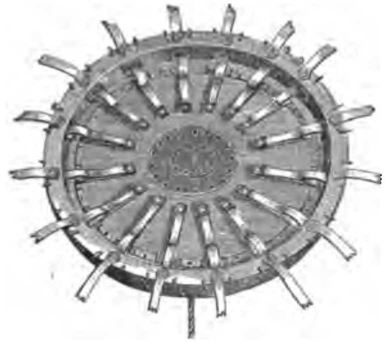
First Balloons made by Montgolfier.

On June 5, 1783, their balloon, weighing 500 pounds, first rose into the atmosphere. It reached an altitude of nearly a mile, remained suspended a few minutes, and, as the air escaped, gradually returned to the earth. The event singularly impressed all classes of society, and the most extravagant notions were entertained of the uses to which balloons might be applied. Several successful ascents were made within the next few months from Paris, and on Nov. 21, 1783, Pilâtre de Rozier and the marquis d'Arlandes, the first adventurers who durst ascend in an unconfined balloon, astonished the world by rising to the height of 3,000 feet, descending in safety not far from Paris. These experiments were mostly made with the Montgolfier balloon, or *montgolfière*, which was inflated with heated air, and the early aëronauts were obliged to carry with them a supply of fuel to renew the rarefied air as fast as it escaped. This clumsy and dangerous expedient subsequently led to disastrous results. On Dec. 1 of the same year Messrs. Charles and Robert left Paris in a hydrogen balloon, in the presence of 600,000 spectators, and after a trip of two hours descended in safety near Nesle, 25 m. distant. M. Charles immediately reascended alone, and had the satisfaction of seeing the sun, which had set when he left the earth, rise and set again. He descended in safety in 35 minutes, 9 m. from his starting point. In this expedition the fall of the barometer and thermometer was first noticed. The first, sinking to 20·05 inches, indicated an ascent of about 9,700 feet. The thermometer sank to 21° F. In 1784 upward of 52 balloon ascents are recorded, the most remarkable being those of Messrs. Charles and Robert, who reached an altitude of 13,000 feet; of Blanchard, the first aërial voyager by profession; and of Prince Charles de Lignes. In January, 1785, Blanchard and Dr. John Jeffries, of Boston, accomplished the daring feat of crossing the channel from Dover to France, narrowly escaping being wrecked in the sea. In the same year occurred the first fatal accident connected with ballooning. Pilâtre de Rozier attempted, with a young man named Romaine Lainé, to cross from France to England in a hydrogen balloon, under which was suspended a small *montgolfière* for the purpose of increasing or diminishing the ascensional power at pleasure. The hydrogen, by its expansion in the rarer upper strata of the atmosphere, pressed down through the tubular neck of the balloon, and reaching the fire of the *montgolfière* was at once ignited. Both balloons were quickly consumed, and the voyagers were precipitated from a height of 3,000 feet upon the rocks near the French coast. As this calamitous occurrence was occasioned by the neglect of proper precautions, aëronauts were not deterred by it. Ascents to the number of many thousands have since been made in Europe and America, both in *montgolfières* and gas balloons, and it is believed that not more than 25 persons have lost their lives in consequence. Of this number of ascents, however, few only have been undertaken for scientific purposes, most having been made merely as a popular spectacle or for the sake of amusement. In this regard both hemispheres have furnished skilful and daring aëronauts. Among the earlier French voyagers was Blanchard, who died in 1809, having made more than 66 ascents, one of which took place in New York in 1796. Mme. Blanchard sometimes accompanied him, and after his death she occasionally ascended alone. In 1819, having ascended from Tivoli garden in Paris with some fireworks, her balloon became accidentally ignited and she was precipitated to the earth and dashed to pieces in the rue de Provence. In later times Eugène and Louis Godard have been the most famous of the French professional aëronauts. Green, the English aëronaut, had probably more experience in the management of balloons than any person who has given attention to the subject. During his professional career of 36 years, ending in 1857, he made nearly 1,400 ascents, crossing the sea three times and falling into it twice. His most interesting voyage was undertaken in 1836, when in company with Messrs. Holland and Mason he journeyed, in a balloon of great dimensions and provisioned for a fortnight, from London to Weilburg, in the duchy of Nassau, a distance of 500 m., in 18 hours. This feat of aërial travelling was however surpassed by Mr. John Wise, the American aëronaut, who with Mr. John La Mountain and two others passed in July, 1859, from St. Louis, Mo., to Henderson in Jefferson co., N. Y., a distance of 1,150 m., in 19 h. 50 m., or at an average speed of nearly a mile per minute. In September of the same year Messrs. La Mountain and Lowe made a voyage of 300 m. in about 4 hours.—The first ascent for the purposes of science was made from Hamburg on July 18, 1803, by Messrs. Robertson and Lhoëst, under the direction of the Russian academy of sciences. A second voyage followed in the succeeding month, and a third from St. Petersburg on June 30, 1804. But although the explorers reached on one occasion an altitude of 23,526 feet, no important results were obtained. In 1804 Laplace proposed to the French academy the solution, by means of observations from a balloon, of certain physical problems, and notably that of magnetic intensity at great heights. Gay-Lussac and Biot undertook to make the observations, and on Aug. 23 ascended from Paris to the height of 13,000 feet. Their experiments in magnetism, electricity, and galvanism gave results identical with those made on the earth. The rotatory motion of the balloon having presented an unexpected obstacle to careful obervations, Gay-Lussac supplied his balloon with long hanging ropes destined to counteract this movement, and on Sept. 15 reascended alone to a height of 23,000 feet, and found a decline of temperature from 82° to 15°, which almost confirmed the theory of a fall of 1° in every 300 feet of elevation. The sky was very blue and the air was found to be very dry. A magnet took a longer time to vibrate than on the earth. He was the first to bring down air collected at this enormous height, which on being analyzed was found to be in its component parts the same as the lower air. In the highest strata of air reached by the balloon he suffered severely from cold. Breathing was difficult, the pulse and respiration were much quickened, and the throat became parched. In 1806 Carlo Brioschi, the astronomer royal of Naples, in company with Andreani, the first Italian aëronaut, attempted to rise from Naples to a greater height than that attained by Gay-Lussac; but in consequence of the bursting of the balloon the explorers were precipitated to the earth, which they fortunately reached without material injury. No subsequent scientific aërial expeditions took place till 1850, when Messrs. Bixio and Barral ascended from the garden of the observatory in Paris in a balloon filled with pure hydrogen gas. They reached a height of 19,000 feet, when an accident to their balloon compelled them to descend without having had the opportunity to make observations of much value. In a second ascent in July of the same year, they reached a height nearly equal to that gained by Gay-Lussac in his second expedition in 1804, but, owing to a tear in their balloon, were unable to rise above a bank of cloud estimated to be 15,000 feet in thickness, and reach the blue sky beyond. The most extraordinary phenomenon noted by them was the sudden variation of temperature during the last few thousand feet of their ascent. At the height of 19,000 feet the thermometer marked 15°, but in the next 2,000 feet it fell to 39° below zero, thus showing a temperature lower by 54° than that noted by Gay-Lussac at a similar elevation. In 1852 Mr. Welsh, of the Kew observatory, in company with Mr. Green, made four ascents from London in the great "Nassau" balloon, with results tending to confirm those already recorded by Gay-Lussac.—The most remarkable and successful ascents ever made for scientific purposes were those of Mr. James Glaisher, F. R. S., from various parts of England in 1862–'6, and of Messrs. Camille Flammarion, W. de Fonvieille, and Gaston Tissandier from Paris and other parts of France in 1867–'9. On Sept. 5, 1862, Mr. Glaisher, accompanied by Mr. Coxwell, an experienced aëronaut who had already made 400 ascents, reached the astounding height of 37,000 feet, or 7 m. above the earth's surface. At the height of 5½ m. Mr. Glaisher gradually lost the use of his limbs, and finally became totally insensible. Mr. Coxwell had meanwhile climbed up to the ring of the balloon in order to free the valve rope, which had become entangled; while doing this his hands became frozen and powerless, and he was compelled to drop down into the car and pour brandy over them to restore the circulation. He then perceived the critical condition of Mr. Glaisher, and endeavored to approach him; but finding himself also in danger of lapsing into insensibility, and being at the same time without the power to move his hands, he seized the valve rope with his teeth, dipped his head downward several times, and found to his relief that the escape of gas caused the balloon to descend rapidly into a warmer temperature. Mr. Glaisher soon after revived, and they returned without further adventure to the earth. The results of Mr. Glaisher's observations induced him to abandon the theory of a decline of 1° of temperature for every increase of 300 feet of elevation. M. Flammarion calculated a mean abatement of 1° for every 345 feet when the sky is clear, and of 1° for every 354 feet when the heavens are overcast; but Mr. Glaisher's midday experiments show that within the first 1,000 feet from the earth the average space passed through for a decline of 1° was 223 feet with a cloudy sky, and 162 feet with a clear sky. Above 10,000 feet the space passed through for a like decline was 455 feet for the former, and 417 feet for the latter; and above 20,000 feet the space with both states of the sky was nearly 1,000 feet for a decline of 1°. In an ascent made by him on July 17, 1862, the temperature was 59° at the surface; at 10,000 feet it had fallen to 26°, and at 20,000 feet it had risen to 42°, which shows a difference of 81° from the temperature recorded by Bixio and Barral at the same altitude in their second ascent in 1850. Notwithstanding the difficulty of extracting any definite law from such capricious data, the results of Mr. Glaisher's observations above quoted afford a much nearer approach to a solution of the problem than the old rule of a uniform rate of decrease. All aëronauts have been aware of the existence of atmospheric currents, often moving in opposite directions, to which they are obliged to trust themselves, if desirous of travelling in a horizontal direction. M. Flammarion made the curious discovery that the traces of his various voyages are all represented by lines tending to curve in one and the same general direction; whence he concluded that above the soil of France the currents of the atmosphere are constantly deviated circularly, and in a south-west-north-east-south direction. Still more curious was the discovery by Mr. Glaisher of what may be called an aërial gulf stream. In his ascent of Jan. 12, 1864, he reached a warm current at a height of 1,300 feet. At 3,000 feet the temperature was 45°, being 3½° warmer than at the surface, and for the next 3,000 feet it was higher than on the earth. It then gradually fell to 11° at 11,500 feet. This warm stratum of atmosphere was a current moving from the S. W. in the direction of the gulf stream. Fine granular snow was falling into it. The existence of this warm S. W. current goes far, Mr. Glaisher thinks, to explain why England possesses a winter temperature so much higher than her latitude would indicate. The same observer found that the time of the vibration of a magnet was greater than on the earth; that the number of pulsations and inspirations increased considerably at the higher elevations, although the same individuals were differently affected at different times; that the velocity of the wind was much greater at a high elevation than near the surface; and that sounds from the earth were more or less audible according to the amount of moisture in the air. When in the clouds at 4 m. high he heard a railway train; but when clouds were below, no sound ever reached the ear at this elevation. The barking of a little dog was heard at the height of 2 m., while a multitude of people shouting was not heard at 4,000 feet. At the greatest heights to which Mr. Glaisher ascended he found that the color of the unclouded sky deepened to an intense prussian blue when the air was free from moisture. He rejects the theory which ascribes this to reflection from vesicles of water, and concludes that it must be caused by reflection from the air, whose polarizing angle is 45°.—Soon after the invention of balloons the idea was entertained that they might be used to advantage in war for purposes of observation and reconnoissance. An aërostatic school was established at Meudon in France, and a number of balloons were distributed among the French army. At the sieges of Maubeuge, Charleroi, Mannheim, and Ehrenbreitstein they proved to be of some value. It is said that the battle of Fleurus was gained by Gen. Jourdan in 1794 mainly through information of the Austrian positions and movements communicated by French officers stationed in a balloon. The machine was held by a cable, but its tether was easily extended by means of a windlass, so that the observers could soar above the enemy's fire. This is the last we hear for many years of the use of balloons in warfare. In the Italian campaign of 1859 they were again employed by the French, and one is reported to have aided them effectually at the battle of Solferino. Early in the American civil war (1861–'5) a balloon corps was organized by the United States war department, in the management of which Messrs. La Mountain, Lowe, and other experienced aëronauts were associated. Mr. Lowe first performed the feat of telegraphing from an aërial station 600 feet above the earth. In the summer and autumn of 1861 many balloon reconnoissances were made along the Potomac and in the neighborhood of Fortress Monroe. The balloon corps formed a part of Gen. McClellan's expedition to the peninsula in the spring of 1862, and when his army in May and June occupied the lines in front of Richmond, the balloons were brought into daily use for purposes of observation. On one occasion, while Gen. Fitz-John Porter was watching the movements of the enemy from a captive balloon, the cable broke, and he was carried over the confederate lines. By pulling the valve string he caused the machine to descend, when it struck a current of air going in the opposite direction, and he landed safely within the Union lines. During the two days of the battle of Fair Oaks Mr. Lowe watched the conflict from an elevation of 2,000 feet, and was the first to announce the enemy's retreat to Richmond. After the retreat of McClellan to Harrison's Landing the balloon corps seems to have been disbanded, and no subsequent employment of the balloon for military purposes is recorded during the war. At the commencement of the Franco-Prussian war of 1870–'71 a proposal was made to Marshal Lebœuf that the French army should be supplied with balloons, but he rejected it. A similar proposal was made to the German war department, which was accepted, but failed because the balloons were placed in unskilful hands. The siege of Paris by the Germans in 1870–'71 gave a new and unexpected impulse to the science of aërostatics. Toward the close of September, 1870, the city was completely invested, and the balloon, rejected by the French government as of no practical use a few months previous, was gladly employed by the besieged as a means of communicating with those parts of the country not under the control of the enemy. As no machine in the city was at that time considered sufficiently trustworthy to pass over the besieging lines in safety, balloon factories were established in two of the principal railway stations, which previous to the capitulation turned out nearly 70 machines. The material of the envelope was calico varnished on the exterior with a mixture of linseed oil and oxide of lead, and the network, car, and other appurtenances were of the customary pattern. The balloons were of an average capacity of 70,000 cubic feet. The first left Paris Sept. 23 with 227 pounds of letters, and descended at Evreux. From that date to the end of the siege, Jan. 28, 1871, 61 others were despatched. Of these, 54 were sent by the post office department, carrying about 2,500,000 letters, which represented a total weight of nearly 10 tons. Most of them also took carrier pigeons intended to bring back news and replies to the outgoing letters. Comparatively few of the pigeons returned to Paris. In order to adapt the weight of the return document to the capacity of the bird, long messages and letters were reduced by photography to within an area not exceeding one or two square inches on paper of the thinnest texture. These slips were generally enclosed in a quill, which was fastened to the central tail feather, and when received they were submitted to the microscope and copied. Most of the balloons were under the management of sailors, whose nautical training, it was supposed, would peculiarly fit them for navigating the air. Several fell into the hands of the enemy, dropping within the hostile lines; and one, the Washington, which left Paris on Oct. 12, was subjected, while crossing the Prussian outposts at an elevation of 2,500 to 3,000 feet, to so severe a fire that the travellers were obliged to ascend rapidly several hundred feet. Some were carried to considerable distances beyond the French frontier, and the Ville d'Orléans was swept into Norway, and came to anchor 600 m. N. of Christiania. Three have never been heard from since they left Paris. To avoid the enemy's fusillade, it was determined in the latter part of November to despatch the balloons at night; but as no lights were permitted in them by the government, the subsequent journeys were attended by unusual perils, the aëronauts being unable to determine their rate or direction of travelling or their distance from the earth. To this unwise provision was doubtless owing the loss of the balloons above mentioned, and the eccentric courses which others took. Gambetta, the leader of the provisional government, was one of the first to leave the city by this means of conveyance, in order to take the control of affairs at Tours. On the night of Dec. 2 Dr. Janssen departed in the balloon Volta for the purpose of observing the total eclipse of the sun on Dec. 22. He noticed that the balloon fell at sunrise and rose again when the sun was several degrees above the horizon, and accounted for this effect by the fact that the envelope upon receiving the first beams of the sun began to radiate heat into space and became rapidly cooler, deriving less heat from the rising sun than it parted with by radiation. This process being finished, it became again susceptible to the sun's rays and reascended. Since the termination of the war it has been announced that the German government have determined to take active steps to effect improvements in military ballooning, and to make it a part of their system.—Notwithstanding nearly a century has elapsed since the invention of the balloon, little or no improvement has been made upon its original form. It consists now, as in the time of Montgolfier, of a spheroidal bag of gas enclosed within a network, attached by ropes to a ring or hoop, from which is suspended a car for the conveyance of the aëronaut. In place of heated air or hydrogen, the latter of which is expensive and requires an elaborate apparatus for its production, it has for many years been customary to use carburetted hydrogen or common coal gas, the mean density of which is about one half that of the air. This improvement in aërostatics was first introduced by Mr. Green, the English aëronaut. The height to which a balloon will rise is determined from the law according to which the density of the atmospheric strata diminishes as the distance from the earth is increased. The buoyant force diminishes with the density, and when it is reduced to a quantity only equal to the weight of the balloon and its appendages, no further ascension can take place. As the pressure of the external air is diminished the expansive force of the confined gas becomes greater; and a balloon quite filled at the surface of the earth would inevitably be torn to shreds at the height of a few miles, unless a portion of the confined gas were allowed to escape. For this purpose the neck of the balloon, into which the gas is introduced, is commonly left open, and the machine is also furnished with a safety valve at the top, which can be opened or shut at pleasure. The valve shown on the next page, invented by M. Giffard, a well known manufacturer of balloons, is considered by M. Tissandier and other high authorities to be perhaps the best thus far made. It consists of a metallic disk four feet in diameter, which is pressed against a wooden hoop by sixteen steel springs; by means of the rope attached to its centre it may be held open, but on this being released it springs back to its place. A good precaution, besides



The Modern Balloon.

the opening of the valve, and one generally adopted, is to inflate the balloon only partially at the surface of the earth. Mr. Glaisher is of the opinion that in order to reach great altitudes the balloon must have a capacity of at least 90,000 cubic feet, of which not more than one third need be inflated with gas, and must carry upward of 600 pounds of ballast. With such a machine he reached a height of seven miles, at which elevation, as we have seen, he became insensible and his companion nearly so. The question of the extreme altitude to which a balloon can ascend can therefore only be theoretically determined, since the vital powers, however strongly organized, must at 37,000 to 40,000 feet of elevation succumb to the intense cold and the attenuated atmosphere which there prevail. The balloon usually rises in an oblique direction under the combined influence of the vertical ascensional force and the direction of the wind. As soon as it mounts into a stratum of air having the same density as itself, it ceases to ascend unless more ballast be thrown out, and follows the course of the aërial current. As regards the particles of air which surround it, it is quite motionless, and the aëronaut may be swept along with the swiftness of a tornado, with nothing to indicate to him, if enveloped in clouds, that he is not in the quiet of a calm. M. Flammarion states that in an aërial journey of 120 m. he never felt himself in motion, and that from a glass of water filled to the brim, which was placed within the car, not a drop was shaken out, although the balloon was constantly rising and falling hundreds of feet. Not the least remarkable phenomenon which presents itself to the aëronaut is the concave appearance of the earth, which arches beneath him as the dome of the sky does above, so that he may be said to float between two vast concavities. In descending, the aëronaut reduces the buoyancy of the balloon by a skilful management of the rope which controls the safety valve, and when the descent becomes too rapid he lightens the machine by throwing over ballast. This is an operation which should be committed only to a practised hand. So delicately does the balloon respond to any alteration in its weight that, as M. Tissandier relates, the throwing out of a chicken bone once caused him to rise from 20 to 30 yards. In descending through a heavy bank of clouds the weight of the balloon may also be considerably increased by the deposited moisture, and the most rapid discharge of ballast will sometimes scarcely prevent a violent collision with the earth. Under such circumstances the guide rope suspended from the car, first adopted by Green, proves of great advantage by acting as a sort of substitute for ballast, as every inch of it which rests upon the ground relieves the balloon of an equivalent portion of its weight.—Of the innumerable schemes which have been propounded for the guidance and propulsion of balloons, not one has proved available, and the machine is still manageable only for vertical motions. It is within the power of the aëronaut to ascend to the utmost height at which human existence is possible, but when he desires to move in a horizontal direction he is for the most part like a rudderless ship at the mercy of the winds and waves. Starting from a given point, he may traverse the segment of a circle, or describe the most eccentric course, and after hours of aërial navigation be as far as ever from his proposed goal. He can rise or fall at pleasure into a current of air seeming to waft him in the desired direction; but so capricious and infinitely various are the atmospheric streams, and so imperfectly defined are their courses, that he will be most likely to find himself only baffled and confused by them. In spite of the results which aërostatics offered in connection with the siege of Paris, Mr. Glaisher seriously doubts the practical use of the balloon. He sees no probability that any method of steering it will be invented, and even intimates that this is not necessarily the first step in aërial navigation, and may possibly have no share in the solution of the problem. He would employ it simply as an aërial observatory, whence an infinite variety of phenomena affecting the laws which control the universe can be noted with a precision not attainable on the surface of the earth. Messrs. Fonvielle and Tissandier, on the other hand, believe that the guidance of balloons has nothing impossible in it, and lay particular stress upon the use to be made by the aëronaut of the natural currents of air flowing at various heights in the atmosphere. But information with regard to these is at present entirely too vague to justify their confidence. Various plans of aërial ships to be propelled and steered by fans, paddles, sails, or other mechanical contrivances, have been projected in Europe and America, all of which, having been designed in ignorance of or indifference to the most rudimentary atmospheric laws, have proved failures. Under the conviction that the balloon can never solve the problem of aërial navigation, the "Aëronautical Society" was established in England a few



Balloon Valve Invented by M. Giffard.

years ago, under the presidency of the duke of Argyll. Absolutely nothing has been accomplished by it yet except to organize a series of experiments on the relation between the pressure and the velocity of air.—See "Travels in the Air by James Glaisher, F. R. S., Camille Flammarion, W. de Fonvielle, and Gaston Tissandier, edited by James Glaisher, F. R. S." (London, 1871).

ÆSCHINES. I. An Athenian orator, rival of Demosthenes, born at Athens in 389 B. C., died at Samos in 314. He was the son of Atrometus and Glaucothea. Demosthenes says Atrometus was a freedman and Glaucothea a prostitute. Æschines, on the contrary, says his father was a true-born Athenian. Demosthenes upbraided him with the fact that his father was a schoolmaster, as though it were a low and sordid occupation. Æschines was afterward clerk to a magistrate, and thus obtained some insight into the laws of his country. He subsequently tried his fortune on the stage, served with distinction in the army, and finally appeared as an orator on the public arena. He was public clerk for two years, and a satellite of the orators Aristophon and Eubulus. In 347 he was sent, along with Demosthenes, as one of the ten ambassadors to negotiate a peace with Philip of Macedon. From this time forth he favored the Macedonian alliance, and opposed the patriotic party of Athens, headed by Demosthenes. He formed one of the embassy who went to receive Philip's oath to the treaty. Timarchus and Demosthenes accused him on his return of malversation. He evaded the danger by a counter prosecution against Timarchus, on account of his bad moral character, which succeeded. Shortly after the battle of Chæronea, in 338, Ctesiphon, an Athenian, proposed that Demosthenes should receive from the state a golden crown. Æschines indicted Ctesiphon for bringing forward an illegal and inappropriate resolution. The cause was not tried until 330, six years after the death of Philip, and when Alexander was in Asia. Ctesiphon was acquitted, and as Æschines had not gained one fifth of the aggregate votes cast, he was liable to pay the penalty inflicted by the Athenian law on him who brought forward a factious resolution. Being unable to pay this penalty, he retired to the island of Rhodes, where he taught elocution for a livelihood, and became the founder of the Rhodian school of oratory. Three speeches of his are extant, showing great narrative and descriptive power, and freer from personal abuse than those of Demosthenes, who reluctantly acknowledged the merits of Æschines. The first is on malversation in his embassy, the second is against Timarchus, and the third against Ctesiphon. II. An Athenian philosopher, a follower of Socrates, and the son of Charinus, a sausage maker. Socrates used to say that the sausage maker's son was the only man who knew how to honor him. Poverty obliged him to go to the court of the younger Dionysius, the Syracusan tyrant, where Plato, then in the ascendant there, treated him with contempt, but Aristippus gave him a large reward for his dialogues. On his return from Sicily, he taught philosophy for a living at Athens. He wrote orations for the forum for hire. Several dialogues on ethical subjects have been with doubtful justice ascribed to him.

ÆSCHYLUS, the eldest of the great Attic tragedians, the son of Euphorion, born at Eleusis in 525 B. C. (4th year of the 63d Olympiad), died in 456. He was of a noble family of the class of the Eupatridæ, and it is probable that he traced his origin to Codrus, the last king of Athens; for among the life archons, who succeeded the kings, was an Æschylus, in whose reign the Olympiads commenced. It is believed that his father was connected with the worship of Ceres; and he was probably himself accustomed from his youth to the spectacles of the Eleusinian mysteries, into which he was afterward initiated. A portion of these he seems to have described in a strange fragment from his drama of the Edoni, the remainder being lost, and he was accused of divulging their secrets in his tragedy of the Eumenides. Pausanias relates of him that Bacchus, of whose worship tragic and dithyrambic odes and spectacles formed a part, appeared to him in a vision—as he himself asserted—when he had fallen asleep in the fields one day, while he should have been watching the vines, and commanded him to write tragedy. At the age of 25 he made his first attempt as a tragic poet; but the next shape in which we find him mentioned is that of a warrior, when, with his two brothers, Cynægirus and Aminias, he received public honors for distinguished valor in the famous field of Marathon. Six years after that battle he gained his first tragic victory, and four years afterward again fought at Salamis, where his brother Aminias received the prize for the greatest courage, being the trierarch who sank the first Phœnician ship, as the poet himself has related in his Persæ, although modestly refraining from mention of this hero's name. He again fought at Platæa, and eight years after this gained the prize for a trilogy, or series of three dramas presented at a single representation, of which the "Persians," the earliest of his extant works, was one. In the latter part of his life he was defeated by Simonides in an elegiac contest for the prize offered for the best elegy to the honor of those who fell at Marathon; but for many years he was esteemed the greatest of tragic poets, having composed, it is said, 70 dramas, 5 of which were satyric, the rest tragedies of the loftiest tone, and gained 13 tragic prizes before he was at length defeated by Sophocles, in 468. Soon after this, whether in disgust at this loss of his poetic laurels, or at a trial to which he is said to have been subjected on an accusation of impiety for the disclosure of the Eleusinian mysteries, as related above, he retired to Sicily, where he was hospitably received by Hiero, in whose honor he composed a drama styled the "Women of Etna"; and he died at Gela, in the 69th year of his age. The real circumstances of his accusation and trial are unknown. Clemens Alexandrinus states that he was tried by the court of the Areopagus and acquitted; while Ælian relates that he would have been stoned to death by the Athenians, had not his brother Aminias awakened the sympathies of his would-be executioners by baring his mutilated arm, from which the hand had been hewn by a Persian scimitar as he was struggling to prevent the launch of a galley from the beach at Marathon. It is, moreover, doubtful whether he ever revisited his native country between the period of his expatriation and that of his death, although many of his pieces, among others the celebrated Oresteian trilogy, composed of the Agamemnon, the Choephori, and the Eumenides, which gained the tragic prize in 458, were performed during this period. The latter fact seems to disprove the whole story of the accusation of impiety as the cause of his taking umbrage toward Athens, as it certainly disposes of its connection with his removal to Sicily. Most doubtful of all is the received account of his death, which was occasioned, says the legend, by an eagle flying overhead with a tortoise in his claws, and dropping the reptile on the bald head of the poet, which he mistook for a stone.—Æschylus was a great improver of the Attic tragedy; in fact, it is he who gave to it first the tragic form, by introducing a second performer, with dialogue, emotion, and action. He also abridged the length of the dithyrambic odes, caused a regular stage to be erected, and was the first to produce his dramas with appropriate scenery and clothe his heroes in befitting costumes. Of his 70 dramas, but 7 have come down to us entire —the Seven against Thebes, the Suppliants, the Persians, the Prometheus Bound, the Agamemnon, the Choephori, and the Eumenides; with but a few fragments of the others. Æschylus is undoubtedly the grandest, the stateliest, and the most solemn of the Attic tragedians; and his style, though difficult and at times rugged, is magnificently sonorous with its many-syllabled compounds. His creed is that of a blind, overruling, ever-present, inevitable necessity, against which it is vain to contend, from which it is hopeless to escape, yet which it is alike the duty and the glory of the great, good man to resist to the end undaunted; of ancestral guilt continually reproduced and punished by the successive guilt of generation after generation; of hapless kindred criminals, who would not be criminals could they avoid it, but are goaded on to the commission of ever new atrocities by the hereditary curse of the doomed race. Such are the legends of the Theban Labdacidæ and the Mycenian Atridæ, predestined murderers, adulterers, and parricides, inextricably involved in the dark net of necessity. It is objected to Æschylus that he deals with horrors only; that his lyre has but one chord of dark and disastrous terror; that he is all iron, and has no key with which to attune the tenderer strings of human sympathies. But it is doubtful whether there is to be found in the whole range of Greek letters deeper pathos than that of the woe of Prometheus, crucified on his Scythian crags for his love to mortals; than that of the choruses in the Agamemnon, descriptive of the disconsolate sorrow of Menelaus deserted by his faithless Helen; and of the sacrifice at the father's bidding of the devoted Iphigenia. Less polished, he is grander than both Sophocles and Euripides.—The tragedies of Æschylus have been rendered into English verse by Dean Potter. A more poetical version is that of the Prometheus Bound, by Mrs. Elizabeth Barrett Browning. The great trilogy, the Agamemnon, Choephori, and Eumenides, was translated (London, 1865) by Miss A. Swanwick, assisted by Mr. Francis Newman. In 1866 appeared Dean Milman's translation of the Agamemnon. The most esteemed editions of Æschylus are by Schütz (Halle, 1808–'21), Dindorf (Leipsic, 1827, and Oxford, 1832), and Scholefield (Cambridge, 1830). Blomfield's edition is excellent as far as it is completed, but it contains only five of the seven tragedies that are still extant.

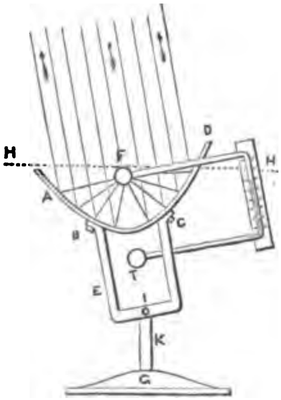
ÆSCULAPIUS (Gr. 'Ασκληπιός), in Greek mythology, the god of medicine and the patron of physicians. In the Homeric poems he is only spoken of as the "blameless physician," whose sons were serving in the Greek army before Troy. The most common story makes him the son of Apollo. He went about healing diseases and raising the dead to life. Pluto, god of Hades, took alarm at the latter exploit, and complained to Zeus, who struck Æsculapius dead with a flash of lightning. The most renowned seat of Æsculapius's worship in Greece was Epidaurus, in Argolis. He had a splendid temple there, with a statue half as large as that of Zeus Olympius at Athens. The cock was commonly sacrified to him, but the serpent was his favorite type. At Epidaurus a peculiar breed of holy serpents were kept about the temple, and into them the god was supposed to insinuate himself. When a city was afflicted with a pestilence, it used to send to Epidaurus for one of these Æsculapian snakes, out of the sale of which the Epidaurian priests reaped large profits. The presence of the god in the pest-stricken city, in the form of a yellowish-brown snake, was held to be propitious, and likely to allay the rage of the pest. About 400 B. C. the Romans, under the pressure of calamity, sent a solemn embassy to request the presence of one of these representatives of Æsculapius. On a later occasion of the same nature (293 B. C.) the worship of Æsculapius was introduced into Rome. There were also famous temples erected in his honor at Cos, Cnidos, and Rhodes. In all these temples were tablets commemorating wonderful cures, on which were recorded the name and genealogy of the patient, his disease, and the mode of recovery. The priests of these temples formed the race of Asclepiadæ, or children of Æsculapius. They were the only regular physicians of antiquity. Formerly the priesthood of Æsculapius was hereditary, but in later times the priests took pupils and initiated them into the mysteries of medicine.

ÆSOP (Gr. *Αἰσωπος*), the fabulist, born about the year 620 B. C., was convicted of the crime of sacrilege while ambassador of Crœsus at Delphi, and thrown from a precipice, about 564. His birthplace is not certainly known, though Phrygia is generally mentioned. While young he was brought to Athens and sold as a slave, but finally received his freedom from his master, Iadmon the Samian. So high was his reputation as a writer that Crœsus, king of Lydia, invited him to reside at his court. He visited Athens during the reign of Pisistratus, where he wrote the fable of "Jupiter and the Frogs." His genuine works have perished, the excellent collection going by his name being either imitations or entirely spurious. The current stories concerning him are taken from a life written by Maximus Planudes, a monk of the 14th century, and prefixed to a volume of fables ascribed to his pen. In this work he is described as hideously ugly and misshapen, which statement is doubtless entirely false, as no personal defects of the kind are mentioned by any classical author. It is rendered still more improbable by the circumstance that his statue was executed for the city of Athens by the famous sculptor Lysippus.

ÆSOPUS, Clodius, a famous tragic actor at Rome, died at a great age about 50 B. C. He was the contemporary of Roscius, and with him the instructor of Cicero in oratory. He was accustomed to identify himself so completely with his part, that once while enacting the character of Atreus, and plotting how to avenge himself on Thyestes, he struck dead with his truncheon one of the stage attendants. He realized a large fortune by his acting, which his son squandered in extravagance and luxury.

ÆSTHETICS (Gr. *αἰσθητικός*, perceptive, from *αἰσθάνομαι*, I feel, or perceive by the senses), the science of the beautiful, first recognized as an independent branch of philosophy about the middle of the last century. Even the ancient philosophers had speculated upon the beautiful. Pythagoras tried to express its form in numerical proportions; Socrates and Plato united it with the good, and called the highest ideal by the compound name "kalokagathon"; Aristotle strove to give its laws in formulas; and later metaphysicians, down to the recent schools, continued these attempts to define its conditions and effect. But Baumgarten, a disciple of the German philosopher Wolf, and in 1740 professor of philosophy at Frankfort-on-the-Oder, first established its claims to the dignity of a separate science. He held that besides the divisions adopted by Wolf's system, namely, the capacity of knowing (intellect), the ultimate ideal and aim of which is the true, and the capacity of acting (will), the ultimate aim of which is the good, there exists also in the human mind a capacity of feeling, or perceiving by the senses (sensibility), the ultimate ideal and aim of which is the beautiful. As logic determines the laws of intellect, and ethics those of will or action, so there should be a branch of philosophy, which he called æsthetics, to determine the laws of sensibility. He made the mistake of considering this faculty, by which men perceive the beautiful, a lower capacity founded in the mere exercise of sense (*cognitio sensitiva*); but Kant, who in his *Kritik der Urtheilskraft* accepted the general division given above, corrected this, and showed that the æsthetic perception, for which the senses form only a means, really falls within the province of the high power of judgment. After 1742 Baumgarten lectured regularly on æsthetics, and its place as a philosophical science was almost universally recognized. In this purely abstract psychological consideration of the subject he followed Kant, who held that the beautiful was the harmony between the understanding and the imagination; and after him several other German philosophers of much less note. Hegel's great work (*Aesthetik*) also treats the subject from this point of view; and Fichte belonged entirely to the ideal school of writers on the æsthetic perception. But the name æsthetics soon began to be received in a more practical acceptation, and to be especially applied to that part of the science of the beautiful which relates to the expression and embodiment of beauty by art. Schiller first turned speculation in this direction; and Schelling, though devoting much study to the abstract, still contributed largely to the useful endeavor to bring the beautiful to the actual knowledge of men, rather than to analyze its psychological effects; and from their time this approach to the identification of the ideal and real has formed the chief and ultimate aim of the study of æsthetics. Two widely different theories as to the realization of the beautiful in art have been adopted by the different schools. One, the method *à priori*, strives by abstract reasoning to determine the laws of the beautiful, with which artists must comply; the other, the method *à posteriori*, seeks for the beautiful in existing works of art, and from the results of such investigation makes practical rules for future guidance. The former has among its adherents most of the German, and the latter nearly all the English and French writers on æsthetics.—Those German authors whose works best deserve study are as follows: A. G. Baumgarten, *Æsthetica* (Frankfort-on-the-Oder, 1750); Georg Friedrich Meier, *Anfangsgründe aller schönen Wissenschaften* (1748); Hegel, *Aesthetik* (Berlin, ed. 1842–'3); Weisse, *System der Aesthetik* (Leipsic, 1830); Schiller, *Aesthetische Briefe*, in Cotta's editions of his works; Zimmermann, *Geschichte der Aesthetik* (Vienna, 1858); Vischer, *Aesthetik, oder Wissenschaft des Schönen* (Reutlingen, 1846–'57); Zeising, *Aesthetische Forschungen* (Frankfort, 1855); Köstlin, *Aesthetik* (Tübingen, 1863); Gottfried Semper, *Der Stil in den technischen und tektonischen Künsten, oder praktische Aesthetik* (Frankfort, 1860–'63); J. Dippel, *Handbuch der Æsthetik*, &c. (Regensburg, 1871). Among Englishmen, Dugald Stewart, Hutcheson, Alison, Jeffrey, and Payne Knight have written on æsthetics; Burke wrote "A Philosophical Inquiry into the Origin of our Ideas of the Sublime and Beautiful," but the work has little depth. The opposing theories of these older writers have long ceased to attract attention; and, as in Germany, later works on the subject have followed the method *à posteriori*. Sir William Hamilton, it is true, in his "Lectures on Metaphysics," considers in the abstract the philosophy of the beautiful; but other recent writers, like Ruskin, whose æsthetical works are the most voluminous, treat of beauty in form and color. Two recent American works may be also noticed: "The Science of Æsthetics," by Henry N. Day (New Haven, 1872), and "Lectures on Æsthetics," by Professor John Bascom (New York, 1872). One of the best modern writers on æsthetics is the French critic Hippolyte Adolphe Taine, whose principal works on art form a series of essays on the productions of almost every school. See his *Philosophie de l'art* (Paris, 1865), *Philosophie de l'art en Italie* (1866), *Voyage en Italie* (1866), *L'Idéal dans l'art* (1867), *Philosophie de l'art dans les Pays-Bas* (1868), &c., translated into English by J. Durand (New York, 1866–'70). Among older French writers on æsthetical subjects are Cousin (*Le vrai, le beau et le bon*) and Jouffroy (*Cours d'esthétique*, Paris, 1842).

ÆTHRIOSCOPE (Gr. αἴθριος, clear, and σκοπεῖν, to observe), an instrument invented by Sir John Leslie for measuring the relative degrees of cold produced by the radiation toward a clear sky. In a metallic cup standing upon a tall hollow pedestal, a differential thermometer is placed in such a manner that one of its bulbs is in the focus of the paraboloid formed by the cavity of the cup, and the other bulb is beyond the hollow of the cup. The interior of the cup is highly polished, and is kept covered by a plate of metal, and only opened when an observation is to be made. As the second bulb is out of the cup, it is not affected by the radiation, the action of which is concentrated upon the first bulb. The contraction of the air in this bulb by its sudden exposure to a clear sky causes the liquid in the stem to rise. The figure represents a vertical section of the æthrioscope. A B C D is the parabolic cup, of which the inside is plated with silver and well polished; in its focus one of the bulbs F of the differential thermometer F H T is placed; the other bulb T is outside the cup. Any difference of expansion between the air in the two bulbs is made visible by the motion of a short column of fluid in the tube, and read off on the scale in H. The support E K, with a hinge in I, connects it with the heavy footpiece G, so that it may be inclined in different positions, and directed toward different portions of the sky. Its inclination should never be made such as to expose the thermometric bulb in the focus F to terrestrial objects above the horizontal line H H, as these would either reflect or radiate terrestrial heat, and so entirely or partially annul the cooling of the bulb F by its own radiation. The polished surface of the cup, like all such surfaces, cannot radiate its own heat, but only reflect that of the bulb F; it forms thus a barrier between the earth and the cup, impenetrable to terrestrial heat.—Leslie could not interpret the indications of this instrument satisfactorily. Not only a passing cloud checked the loss of heat, but, he says, "sometimes under a fine blue sky the æthrioscope will indicate a cold of 50 millesimal degrees, while on other days, when the air seems equally bright, the effect is scarcely 30°." It has only recently become known that such differences are due to the presence of aqueous vapors in the air, totally invisible to the eye, but which, being more or less opaque to the feeble rays of radiant heat, screen the bulb and reflecting cup of the æthrioscope against loss of heat by radiation, while a dry atmosphere admits this radiation to pass, and more freely in proportion as the air is more dry. The æthrioscope is therefore at the present day used as a hydrometer to determine the amount of invisible moisture present in the upper inaccessible strata of our atmosphere.



AËTION, a famous Greek painter, supposed to have lived in the first half of the 2d century. He was distinguished for the beauty of his coloring, and esteemed the first painter of his time. Lucian gives a description of a very fine painting by him, representing the nuptials of Alexander and Roxana, which was displayed at the Olympic games.

AËTIUS, surnamed the Atheist, from his supposed denial of the God of revelation, an oriental heresiarch, born in Antioch, died in Constantinople, A. D. 367. In early life he was successively the slave of a vine-dresser's wife, a travelling tinker or a goldsmith, and a quack doctor. He then studied medicine and theology at Antioch, and became prominent as a disputant. His theories (the chief of which were the Anomœan doctrines that the Son is of a nature unlike and inferior to that of the Father, and that the Holy Spirit is but a creature made by the Father and Son before all other creatures) incensed the Arians, and he was thrice compelled to seek safety in flight; but at length he was ordained deacon by Leontius, bishop of Antioch. He now developed, in connection with Eunomius, his pupil and amanuensis, a new schism known as the Aëtian or Eunomian heresy, and made many disciples. He was condemned by the council of Seleucia in 359, and banished by Constantius to Amblada, in Pisidia. After the death of Constantius he was recalled to Constantinople by Julian, and made a bishop. He adopted every means of spreading his heresy, but, having by his intrigues and immorality alienated all his friends, died unpitied by any but Eunomius, who buried him.

AËTIUS, a general of the western empire, born in Mœsia about A. D. 396, murdered in 454. He was brought up, owing to the influence of his high-bred Italian mother, in the imperial body guard of Honorius, and after the death of his father Gaudentius, an illustrious Scythian and master general of cavalry, who lost his life in a mutiny, he was given as a hostage to the king of the Huns. On his return to Rome he was made count on occasion of his marriage with the daughter of Carpileo, and became attached to the household of Joannes. After an ineffectual support of this usurper in 425 with an army of 60,000 Huns, whom Aëtius conducted into Italy under the guidance, it is said, of the then youthful Attila, he turned traitor against the treacherous cause he had espoused, and after the death of Joannes he succeeded in obtaining from Placidia, mother of Valentinian III., the chief command over the army of Gaul, as the condition of his procuring the peaceful retreat of the Huns. In this post he displayed great military skill, delivering Arles from the Visigoths, recovering from Chlodio, king of the Franks, the parts of Gaul bordering on the Rhine, overpowering the Juthungi in Bavaria, bringing to an end the Vindelician war, and in the following spring crushing the confederated forces of the Burgundians, Huns, Heruli, Franks, Sarmatians, Salians, and Geloni, in one terrible encounter. In 432 his rival Boniface, who had been urged to treason and then betrayed by himself, returning from the province of Africa, which his treason had thrown into the hands of the Vandals, and obtaining the dignity of master of the horse, they fought a duel at Ravenna on the challenge of Aëtius, of the wounds received in which Boniface soon afterward died. But Aëtius, fearing for his life, which was threatened by his late rival's adherents, fled into Pannonia, and led a second army of Huns into Italy, threatened the throne of Valentinian, and, although the feeble emperor called in the aid of the Visigoths, forced the empress and her son, without an engagement, to submit to his terms, and returned as before with accumulated honors, to resume command of the army of Gaul. Here he once more displayed genius as a general, routing the Burgundians with exceeding slaughter, and forcing their king to throw himself on his mercy. In the mean time, Roas, king of the Huns, died, and was succeeded by Attila and his brother Bleda, the latter of whom being soon murdered, Attila assumed the sole dominion, and was speedily involved in hostilities with both the Roman empires. For several years his arms were directed chiefly against the eastern empire, but in 451 he set in motion his vast army of a thousand nations, debouched from the defiles of the Hercynian forest, crossed the Rhine on rafts, and fell like a torrent on the rich plains of Gaul. Here for a time all fell before him, till, when he was in the very act of storming the walls of Orleans, while his Huns were mounting the breaches, the spears of Aëtius and Theodoric the Visigoth appeared on the horizon, and, amid cries of "The aid of God" from the beleaguered citizens, the siege was raised, and the Hunnish hordes were forced to retreat. Some days later a tremendous pitched battle was fought on the field of Châlons, in Champagne, in which 162,000, or, according to other accounts, 300,000 men fell on both sides. The Huns were so completely defeated, that Attila prepared a funeral pile and contemplated burning himself alive, with his treasures, his women, and his baggage wagons, had the Romans renewed the battle on the following day. But Theodoric lay dead, and Aëtius suffered the Huns to escape. After this he purposely remained inactive during the remainder of the war, took no measures to oppose the invasion of Italy, and even advised Valentinian to evacuate that country and take refuge in Gaul, which would have left himself master of Rome, where by his great abilities he would speedily have rid himself of the Huns and assumed the imperial purple. Aëtius is believed, according to Marcellinus, to have been implicated in the sudden death of Attila (453); but there is no evidence to support this, excepting that Aëtius always had his emissaries, in the shape of confidential Greek secretaries, about the person of Attila, who had never ceased to intrigue with him. In the end he fell by a crime and a treason as base as his own, stabbed by Valentinian with his own hand, during a friendly interview. The circumstances of this murder are not clearly known, although a coin which has been preserved, bearing the inscription *Aëtius Imperator Cæsar*, proves that he had assumed the imperial purple, and actually declared himself emperor, before he was killed. Nominally a Roman, he invariably betrayed Rome to the barbarians except when it was for his own interest to defend her, and then the ease with which he conquered them showed what he might have done had he been honest. Nominally a Christian, he brought up one of his sons, Carpileo, in a heathen court, as a heathen, and destined him to wear the crown of a heathen nation; while the other, Gaudentius, he proposed to invest, after himself, with the purple of the western empire. Gibbon says that during the decay of the military spirit, the Roman armies were commanded by two generals, Aëtius and Boniface, who may be deservedly called the last of the Romans.

ÆTOLIA, a western division of the mainland of Greece, on the N. shore of the gulf of Corinth or of Lepanto, W. of Doris and Locris, and E. of Acarnania, and divided by the narrow strait between Rhium and Anti-Rhium from Achaia. It is bounded W. by the Achelous, now the Aspropotamo, and N. by Thessaly and Epirus. Its chief city in antiquity was Thermus, in the interior, on the river Evenus, now Fidhari. Ætolia is said to have been originally settled in the ante-heroic times by the Curetes, who were conquered by the hero Ætolus, son of Endymion, with a band of followers from Elis, in the Peloponnesus. During the mythic and heroic ages Ætolia was distinguished as the seat of many of the richest and most poetical of the legends of early Greece. In the days of Thucydides, however, the Ætolians were still a barbarous and uncouth tribe. During the Peloponnesian war they played no considerable part, nor do they appear prominently in Greek history until nearly a century later. On the death of Philip of Macedon and the accession of Alexander (336 B. C.), the Ætolians displayed such hostility to the latter as drew down his signal vengeance. According to Pausanias, Greece owed much to the Ætolians for their energy in beating back the Gallic hordes. With this exception, the Ætolians seem to have fought on any side to which the hope of plunder allured them. With Alexander of Epirus, the son of Pyrrhus, they formed a coalition for the sake of dismembering Acarnania for their own advantage; and again they banded themselves with Cleomenes III. of Sparta, hoping to overthrow the Achæan league. After the death of Antigonus Doson of Macedon (220), they carried their arms into the Peloponnesus in a series of predatory incursions, for which they were severely chastised by Philip V., the successor of Antigonus, who sacked and destroyed their capital, Thermus. In the latter years of the second Punic war the Romans were hard set to avert the consequences of the alliance between Hannibal and Philip V. of Macedon; the Ætolians, with their allies, attached themselves to the Romans, and enabled them, by the employment of a small naval squadron, and a trifling body of forces under the prætor Lævinus, to neutralize all the preparations of Philip, until they had rid themselves of their principal opponent on the field of Zama (202). At the battle of Cynoscephalæ (197) their cavalry greatly distinguished itself, charging home ten times against the Macedonians, who were at first victorious, and giving the consul Flamininus time to bring up his reserves and convert a half-lost day into a complete victory. For this they expected to reap their reward in the dismemberment of Philip's dominions; but it was denied to them by the Romans. The Ætolians now attempted an alliance against their late allies with Antiochus the Great of Syria, who had been prompted to hostilities against Rome by Hannibal; but after a single defeat by the Roman consul Glabrio in the pass of Thermopylæ (191), the latter retreated into Asia, leaving his Greek confederates to the mercy of the enemy. The polity of the Ætolians from this time, and indeed before, consisted of a federal government similar to the Achæan league, at one time embracing a number of neighboring territories; but being swallowed up with the rest of Greece in the universal empire of Rome (146), Ætolia followed her fortunes, and afterward shared the reverses of the eastern empire. Possessed on the irruption of the barbarians by Slavic hordes, Ætolia was reconquered and partially civilized, together with the Illyrians and Dalmatians, by the Venetians during the middle ages, and subsequently became, like the Morea, the scene of deadly conflict against the victorious Turks. In later times it fell under the power of Ali Pasha of Albania, and it was the scene of some of the most important events of the Greek revolution.—The principal seaport town of modern Ætolia is Missolonghi. The climate is delicious, but along the seacoast and the swampy river shores the autumnal season is marked by fevers. The plains are rich and fertile in maize, wine, silk, and fruits; the mountain scenery is magnificent. (See ACARNANIA.)

AFANASIEFF, Alexander Nikolaievitch, a Russian author, born in Moscow in 1826, died in October, 1871. He studied at the university of Moscow, and was secretary to the council of magistrates in that city. He is the author of *Narodniya Ruskiya skazki* ("Russian Popular Tales," 4 vols., completed in 1863), a series of stories taken down from the mouths of Russian peasants, with critical notes. His other great work, *Poetitcheskiya vozzryeniya Slavyan na prirodu* ("Poetic Views of Nature entertained by the ancient Slavs," 3 vols., completed in 1869), is a mine of wealth on the subject of Slavic legends and popular conceptions in respect to the spiritual and material world. He was also a frequent contributor to the Russian press of articles bearing on Slavic history, literature, and archæology.

AFER, Domitius, a celebrated orator, the teacher of Quintilian, born at Nîmes in the reign of Tiberius, died in the reign of Nero, A. D. 60. His pupil speaks highly of his pleadings, and mentions several of his works, none of which have come down to us.

AFFIDAVIT (Lat., he has sworn or deposed), a statement in writing, signed by the deponent and verified by his oath or affirmation made before a person authorized to take it. The affidavit is the instrument by which the action of courts is invoked in proceedings taken in the first instance *ex parte*, either with reference to existing actions or in special proceedings independent of such causes. Thus it is used in actions for the purpose of procuring attachments or injunctions, or in support of motions of any sort incidental to the suit in its ordinary course; or to obtain a writ of mandamus or of habeas corpus, or a warrant for the arrest of a criminal; or upon an application to oppose or vacate any of these or the like proceedings. As affidavits are in such cases *ex parte*, that is to say, when they are presented by the applicant for the relief, there is no final adjudication upon the matter involved until the other party interested has had an opportunity to be heard. But the sworn allegations of the first party are ordinarily sufficient to set the power of the court in motion in his favor. For the reason, too, that an affidavit is *ex parte* or one-sided, it is the general rule that the testimony of witnesses in causes tried in courts cannot be received in this form. A party to an action has the right to cross-examine witnesses offered against him, and this right would be annulled by admitting affidavits against him.—No particular form of an affidavit is prescribed by our law; but in England very lately the courts have made some very expedient rules on the subject which are intended to cure some of the most frequent abuses and defects of these instruments. They require that the affidavit shall be framed in the first person, and be divided into paragraphs consecutively numbered, and each of them containing as far as possible a distinct portion of the subject. The occupation and residence of the deponent must be inserted. When the paper is sworn to by an illiterate person, the jurat, or certificate of the officer who administers the oath, must state that the affidavit was read over to the party, and that he seemed to understand its contents. The jurat must also certify that the signature or mark of the deponent was made in the officer's presence. The affidavit cannot be read in court if there are any interlineations or erasures in the jurat, or if there are any in the body of the affidavit, unless they are noted with the initials of the officer.—As to the form and nature of the instrument generally: If the affidavit is made with reference to any pending action, it should be headed with the title of that action and the name of the court. It must specify the state and county in which it is made, in order that it may appear on the face of the paper that the officer who took the oath had capacity to do so; for the power of the officer in this respect is confined to certain limits, and an oath administered outside of his jurisdiction is a nullity. Then follows the statement of facts, and this, according to a practice much followed now in New York, should be a simple narrative in the first person and confined to facts which are within the actual knowledge of the deponent. Facts communicated by third persons are not proper, unless the affidavits of those persons cannot be obtained; and in that case the sources of information should be given, and also the reason why the parties who have actual knowledge do not themselves testify. The statement must be signed by the deponent, or marked if he cannot write, though the omission of the signature or mark will not be fatal if the jurat shows that the affiant actually swore to the statement. The jurat is the clause which is appended by the officer taking the affidavit, in which he certifies the time when and the fact that the deponent made oath to the instrument before him.—The persons who may take affidavits are designated by law. In England they are the judges and certain commissioners and authorized attorneys and solicitors. The authority of these last must be entered in a book kept for public reference. Conveyancers who are not attorneys or solicitors of the courts at Westminster cannot be qualified. In the United States, judges, justices of the peace, commissioners of deeds, notaries public, and other and similar officers have authority by statute to take affidavits. All the states also appoint commissioners residing in other states and territories, and give them the same power as to such instruments to be used in the states which appoint them. The certificates of these officers are ordinarily further verified by the secretaries of state of the appointing states, who keep a record of all qualified commissioners. By recent statutes of New York (1863 and 1869), affidavits to be used there may be taken in foreign countries and in other states by any person who is authorized there to exercise a like power. Judges of the higher courts in other states are also vested by most of the states with the same powers given to their commissioners. Generally, the authority of all foreign officials to administer oaths must be verified by some court or higher officer of the foreign state; or when a judge takes the affidavit, his signature must be authenticated by the clerk and seal of his court. Certain officers of the United States residing abroad, the consuls at London and Paris for example, may also take affidavits, and their consular seals sufficiently authenticate their acts. British ambassadors and consuls have similar powers by the English law. In 1862 a law was passed in New York authorizing colonels of the state regiments and certain other military officers to take affidavits of persons in actual service out of the state.—An affidavit of merits is one made by a defendant which sets forth that he has stated the case to his counsel, and that he is advised by him that he has a good defence to the action upon its merits. This affidavit is required by law, in order that a defendant may not delay a plaintiff's remedy by making groundless defence to his suit; but the requirement of it does not always accomplish the designed object.

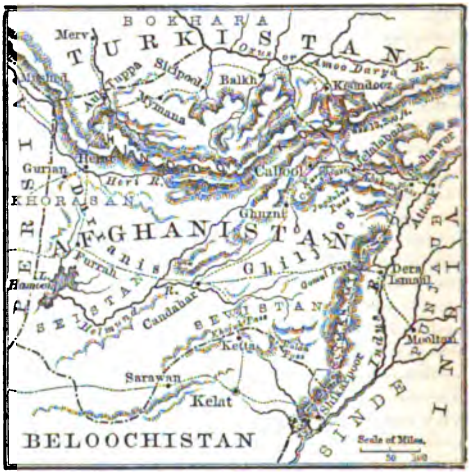
AFFINITY, the imputed relationship which exists in consequence of marriage between the husband or wife and the kindred by blood of the other. Thus, for example, the wife's kindred bear the same relation by affinity to the husband that they bear to her by consanguinity. Affinity also exists between the husband and one who is connected by marriage with the blood relations of the wife. Two men, for instance, who are married to sisters are related by affinity, but there is no such relationship between the blood relations of the husband and those of the wife, and it ceases properly when the husband or wife dies without leaving issue. Affinity is significant in the law because it constitutes a disqualification of judges or jurors, equally with consanguinity. When such a disqualification exists, the judge cannot act even with the consent of both parties; and if he does, the judgment may be vacated. Thus it has been held in New York that there was a disabling affinity between a judge and the defendant in a cause before him, because the defendant's deceased husband was a first cousin of the judge, and the son of defendant by that husband was still living. This living son preserved the affinity, which otherwise would have ceased on the husband's death. Affinity is also significant in the laws of marriage. The ecclesiastical law made certain marriages unlawful though they were contracted between persons whose relationship to each other was very remote. Though the statute of 32 Henry VIII., which has virtually furnished the rules of the English law on the subject ever since, forbade the ecclesiastical court to impeach the validity of any marriage between parties who were without the Levitical degrees, yet it was always held under it in England that affinity was an impediment to the same extent as consanguinity; and out of this interpretation of the statute came that rule of the law which has been so much discussed and assailed in England, that a man may not marry his deceased wife's sister. The reason given was that the marriage made the wife's sister the husband's sister; and although in the other branches of the law, with respect to judicial officers for example, the death of either party destroys the affinity and the disqualification, yet the same result has not been conceded in matrimonial cases.

AFFINITY, Chemical, the name given to the force which combines together chemical elements so as to form compounds. Of its real nature or essence we are entirely ignorant, as we are of the essential nature of other material forces. The term chemical attraction has also been applied to this force, on the hypothesis that it draws together chemical atoms. In many cases there can be no doubt that the chemical particles come nearer together when they combine: thus if two volumes of hydrogen and one volume of oxygen be caused to unite, we do not get three volumes of steam, but only two; that is, the particles have approached so much closer in combining as to occupy but two thirds of their former space. In other cases, however, compounds are found to occupy exactly the same space that their elements did before combination, and sometimes they fill even a greater space. Hence the term chemical attraction has been thought objectionable. Chemical affinity is that link or tie which binds together unlike kinds of matter, in such an intimate manner that the properties of the elements are lost, and a compound with new properties is produced. It is in this that it differs from cohesion, which only unites or aggregates similar particles without altering properties. The particles in a piece of iron or sulphur are held in union by cohesion; but when sulphur and iron combine chemically, both elements disappear, lose their properties and identity, and a new compound is formed—the sulphuret of iron. Newness of properties in the compounds formed is the distinguishing peculiarity of chemical affinity. It obliterates the characteristics of the elements, and generates new properties in the product. Cohesion is usually said to act between homogeneous particles, as in the cases just cited of sulphur and iron; but it may also act between dissimilar substances, as where silver is inlaid with steel, or copper metal united to tin, or iron coated with zinc, or wood joined to glue, or paper to paste, or pitch to the fingers. These, however, are mechanical combinations; there is no destruction of the properties of the combined substances, and those of the combination are not new, but are the same as the properties of the constituent substances, each of which retains its individuality. The force of gravitation is brought into play between masses of matter at all distances; chemical affinity acts only when the elements are in contact or at insensible distances. For this reason affinity is most energetic when one or both of the elements are in a state of solution, the approach of the atoms being then most perfect. It was once thought that chemical affinity could not take effect without the intervention of solution; and although the statement is generally true, yet there are some substances whose affinities are so intense that they will unite even in the solid state when made to touch each other. The action of affinity is heightened, modified, and suspended by various other causes. Among these heat is most potent, and most easily available in the laboratory and chemical manufactory. Thus carbonic acid and lime unite strongly at common temperatures, forming marble or limestone, but at a red heat their affinity is annihilated and they separate. On the other hand, potash and sand will not actively combine at ordinary temperatures, while at a red or white heat, at which they are melted, combination takes place and glass is formed. Light also influences affinity, promoting combination and decomposition. If chlorine and hydrogen gases be mixed in the dark they will not unite, but exposed to light they combine at once; while in every green vegetable leaf carbonic acid is decomposed every day under the influence of solar light. The recent investigations in photography have greatly multiplied the number of substances over which light is known to exert a chemical influence. Electricity also has a governing action over affinity. An electric spark, shot through a mixture of oxygen and hydrogen gases, causes them to combine instantaneously and explosively, producing water; while a steady electric stream sent through the water annuls the affinity of its elements and sets them free again. Other causes also, known and unknown, affect in various ways and degrees the play of affinity; indeed, a full statement of them would involve almost the whole science of chemistry.—The changes in the properties of substances produced by affinity are numberless and surprising. When solid charcoal and sulphur combine, the compound formed is colorless as water, and highly volatile. If yellow sulphur and bluish white quicksilver be heated together, they form the bright red vermilion. Waxy phosphorus and colorless invisible oxygen unite to form a white body resembling snow. Nitrogen and oxygen are tasteless, separate or mixed; yet one of their compounds, laughing gas, is sweet, and another, nitric acid, intensely sour; they are both transparent and invisible, yet they form a cherry-red compound gas. Charcoal and hydrogen are odorless; nevertheless, many of our choicest perfumes, such as oils of roses and bergamot, as well as the less agreeable spirits of turpentine and illuminating gas, contain only these elements. The mild and scentless nitrogen and hydrogen give rise to one of the most odorous and pungent compounds, ammonia; while suffocating and poisonous chlorine, united to a bright metal, sodium, yields common salt. Charcoal, hydrogen, and nitrogen, which singly or mixed are not injurious to life, yet combine to form the terrible poison prussic acid; while charcoal, hydrogen, and oxygen, variously united, produce sweet sugar, poisonous oxalic acid, and intoxicating alcohol.—The strength of affinity among different elements is various. Thus the chemical energies of sulphuric acid are superior to those of carbonic acid; if the former be united to carbonate of lime, it takes the lime away from the carbonic acid—that is, produces decomposition and a new compound. It has been attempted to establish a scale of affinities among various chemical substances to form the basis of an order of decomposition; but affinity is disturbed and overcome by so many circumstances that such tables are of but little value. For the laws of affinity or chemical combination, see ATOMIC THEORY.

AFFIRMATION, a mode of solemn verification permitted by the law, in the place of an oath, to persons who are unwilling from conscientious motives to be sworn. This departure from the usual rule of exacting an oath was first introduced into the English law in favor of Quakers; but by the present law there, and ever since 17 and 18 Victoria, ch. 125 (1854), any person called as a witness or desiring to make an affidavit or deposition, who will solemnly declare that the taking of an oath is, according to his religious belief, unlawful, may affirm or declare to the truth of his statement; and the statute requires that the officer taking the affirmation shall recite in his certificate that the affirmant declared that an oath was unlawful according to his religious belief. By the statute of 24 and 25 Victoria, ch. 66 (1861), all persons refusing to be sworn in criminal proceedings may make their solemn affirmation instead. In the United States an affirmation, even without the suggestion of any reason for preferring it, is probably everywhere received in place of an oath. The legal effect of both is the same, and perjury is committed by affirming as well as by swearing falsely, wilfully, and corruptly.

AFFRE, Denis Auguste, archbishop of Paris, born at St. Rome-de-Tarn, Sept. 27, 1793, died in Paris, June 27, 1848. He was educated in the seminary of St. Sulpice, and was made teacher of philosophy in that of Nantes before he had attained the age required for the priesthood. After his ordination he was attached successively to the seminary of St. Sulpice and to the foundling hospital, and subsequently as grand vicar assisted the bishops of Luçon and Amiens. In 1834 he was attached to the diocese of Paris as canon and honorary vicar general. In 1839 he was appointed coadjutor to the bishop of Strasburg, but never took possession of this office; for the archbishop's see of Paris having become vacant, he was appointed to it, and consecrated Aug. 6, 1840. In this office he distinguished himself by zeal for ecclesiastical education, and for the alleviation of poverty and misfortune. While the insurrection of June, 1848, was raging in the streets of Paris, he determined to make a personal attempt to stop bloodshed. On the 25th he called upon Gen. Cavaignac, and, although warned by him of the great danger of his undertaking, repaired to the faubourg St. Antoine, the stronghold of the insurgents. On his appearance between the two hostile parties at the place de la Bastille, the firing was suspended, and he calmly and steadily proceeded toward the barricades without any protection except the gold cross on his breast and a green branch carried before him, in token of peace, by a young attendant. He was admitted behind the barricades, and had just begun to address the insurgents, when the report of a musket was immediately followed by a renewal of hostilities, and in the confusion the archbishop fell, shot by some unknown hand, and was transported to the hospital of the *Quinze-Vingts*. He expired two days later, a martyr of charity, as was proclaimed by the national assembly. He was the author of several religious and educational works.

AFGHANISTAN, an extensive country of Asia, between lat. 28° 30′ and 36° N., and lon. 60° and 71° 30′ E., bounded N. by Turkistan, E. by the Punjaub and Sinde, S. by Beloochistan, and W. by the Persian highlands of Khorasan. Area estimated at upward of 215,000 sq. m.; pop. upward of 5,000,000, and estimated even as high as 9,000,000. The surface of Afghanistan is very irregular—lofty table lands, vast mountains, deep valleys, and ravines. Like all mountainous tropical countries, it presents every variety of climate. In the Hindoo Koosh the snow lies all the year on the lofty summits, while in the valleys the thermometer ranges up to 130°. The heat is greater in the eastern than in the western parts, but the climate is generally cooler than that of India; and although the alternations of temperature between summer and winter, or day and night, are very great, the country is generally healthy. The soil, where not too rocky, is very fertile. Date palms flourish in the oases of the sandy wastes; the sugar cane and cotton in the hot regions; and European fruits and vegetables on the hillside terraces up to a level of 6,000 or 7,000 feet. The mulberry tree flourishes in the cool valleys. The mountains are clothed with noble forests, which are frequented by bears, wolves, and foxes, while the lion, the leopard, and the tiger are found in districts congenial to their habits. There is a fine variety of sheep of the Persian or large-tailed breed. The horses are of good size and blood. The camel and ass are used as beasts of burden. The country is rich in lead, plumbago, saltpetre, sulphur, salt, and alum. The iron is believed to be equal to any in the world, while the copper ore yields in some localities nearly 80 per cent. of the metal. Besides the Hindoo Koosh on the northeast, there is a chain called the Solyman mountains on the east and southeast; and between northwestern Afghanistan and Balkh there is a mountain labyrinth known as the Paropamisan range, which has as yet been little explored. Several minor ranges traverse the interior. The rivers are few in number; the Helmund and the Cabool are the most important. These take their rise in the Hindoo Koosh, the Cabool flowing east and falling into the Indus near Attock, the Helmund flowing southwest through the centre of the country and falling into the lake of Hamoon. The Helmund overflows its banks annually like the Nile, bringing fertility to the soil, which, beyond the limit of the inundation, is sandy desert. The four principal cities, Cabool, the capital, Ghuzni, Candahar, and Herat, are important stations on the highway of commerce from India to central and western Asia. Cabool and Jelalabad protect the passage to India on the north, Candahar on the south, and Herat, in the extreme west, guards the Persian frontier.—The geographical position of Afghanistan, and the peculiar character of the people, invest the country with a strategical and political importance that can scarcely be overestimated in the affairs of central Asia. The government is a monarchy, but the king's authority over his high-spirited and turbulent subjects is personal and very uncertain. The kingdom is divided into provinces, each superintended by a royal officer who collects the taxes. The Afghans are a brave, hardy, and independent race; they follow pastoral or agricultural occupations only, eschewing trade and commerce. They are divided into clans, over which the various chiefs exercise a sort of feudal supremacy. The two principal tribes are the Durranis and Ghiljies or Ghilzais, who are frequently at feud with each other. The Durranis are the more powerful, and the military contingents are chiefly furnished by them. Justice in the towns is administered by cadis, but the Afghans rarely resort to law. Avenging of blood is a family duty; and the rights of hospitality are sacred. In religion they are, with the exception of some not purely national portions of the population, Sunnite Mohammedans, and are consequently opposed to the Persians, who are Shiahs; but they are not bigoted, and alliances between Shiahs and Sunnis are by no means uncommon; and they are tolerant toward Christians and Hindoos.—Afghanistan was subjected for centuries alternately to Mongol and Persian dominion. Previous to the advent of the British on the shores of India, the foreign invasions which swept the plains of Hindostan always proceeded from Afghanistan. Sultan Mahmoud the Great of Ghuzni, Genghis Khan, Tamerlane, and Nadir Shah all took this road. After the death of Nadir in 1747, Ahmed Khan, who had served under him, liberated his country from Persia and made himself king. Under him Afghanistan reached its highest point of greatness and prosperity in modern times. He belonged to the Durranis, and his first act



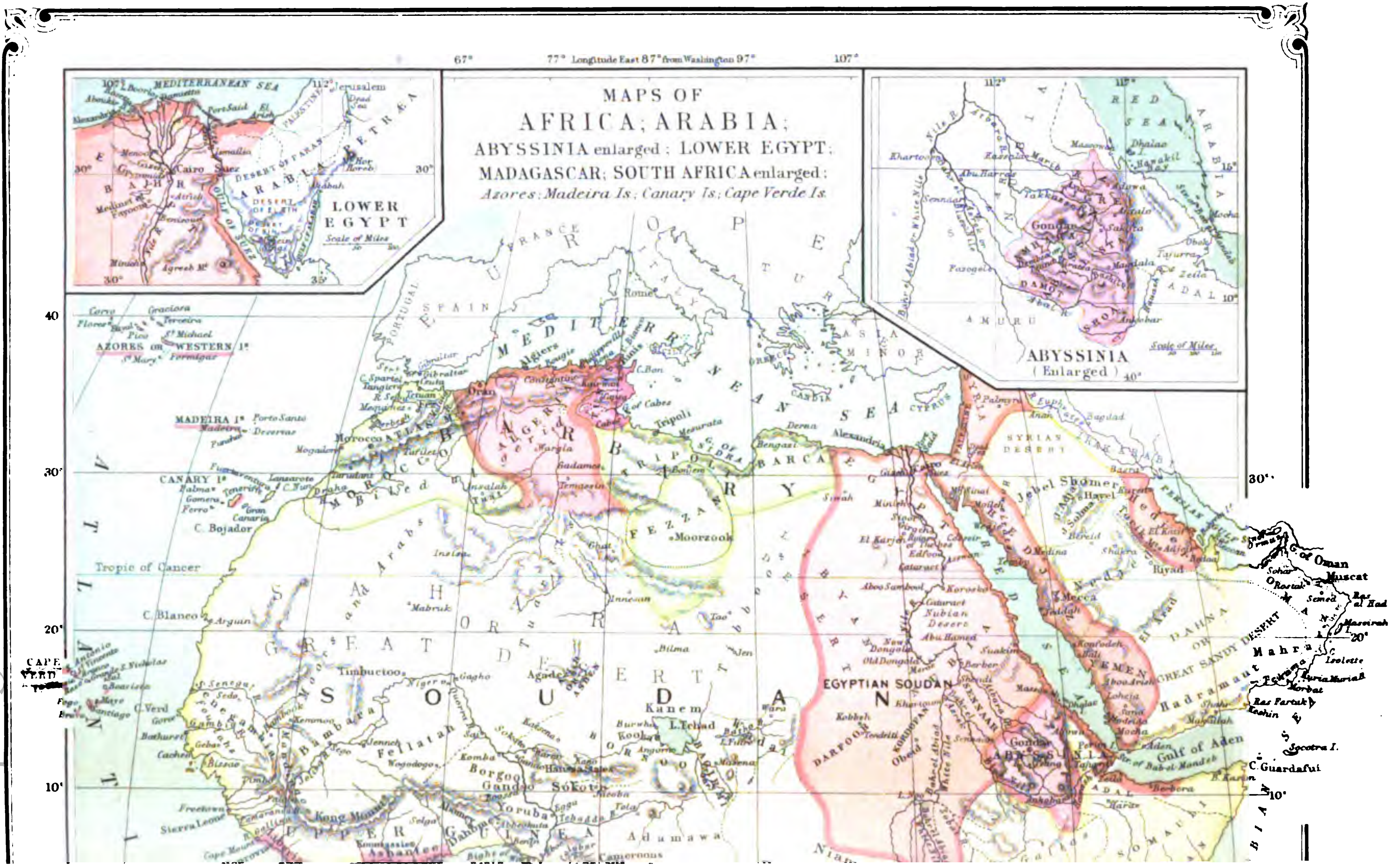
was to seize upon the booty which his late chief had gathered in India. His kingdom extended from Khorasan to Delhi, and he even measured swords with the Mahratta powers. He died in 1773, and left his crown to his son Timour, who was unequal to the weighty charge. He abandoned the city of Candahar, and removed the seat of government back to Cabool. During his reign the internal dissensions of the tribes, which had been repressed by Ahmed, were revived. In 1793 Timour died, and Zemaun succeeded him. This prince conceived the idea of consolidating the Mohammedan power of India, and this plan was thought so important by the English that Sir John Malcolm was sent to the frontier to keep the Afghans in check in case of their making any movement, and at the same time negotiations were opened with Persia, by whose assistance the Afghans might be placed between two fires. Zemaun's plans were, however, frustrated by a contest between him and his brothers, which ended in Mahmoud's accession to the throne. The latter was compelled to abdicate in 1823, and died in 1829, the last of the Durrani dynasty. Afghanistan was now ruled by three brothers, the ablest of whom, Dost Mohammed, was in possession of Cabool, the most important of the three divisions of the country. He was soon involved in war with Lahore on the east, and on the west with the Persian invaders of Herat, who were believed to be abetted by Russia. In 1838 England declared war against Afghanistan, upon the ground that Dost Mohammed had attacked her ally Runjeet Singh, who had established an independent kingdom in the Punjaub, and that Shujah, whom the English regarded as the lawful heir to the throne of Afghanistan, had placed himself under British protection. In December, 1838, the Anglo-Indian army, under Sir John Keane, marched toward Sinde, which country was coerced into submission and the payment of a contribution for the benefit of the Sikhs and Shujah. On Feb. 20, 1839, the British army passed the Indus. It was about 12,000 strong, with 40,000 camp followers, besides the new levies of Shujah, and suffered severely on the march. They penetrated through the Bolan pass, and on April 25 entered Candahar, which the brothers of Dost Mohammed had abandoned. After a rest of two months, Ghuzni, the impregnable stronghold of Afghanistan, was taken, July 22, by blowing open the only gate which had not been walled up. After this disaster the army which Dost Mohammed had collected at once disbanded, and Cabool opened its gates Aug. 6. Shah Shujah was installed in due form, but the real direction of government remained in the hands of the British envoy, Sir William McNaghten, who also paid all Shujah's expenses out of the Indian treasury, as well as those of the principal chiefs. Dost Mohammed surrendered in October, 1840, and was sent to India. The conquest of Afghanistan seemed accomplished, and a considerable portion of the troops were sent back. But during the whole of 1840 and 1841 insurrection followed insurrection in every part of the country. The Anglo-Indian troops had to be constantly on the move. The occupation of Afghanistan cost the Indian treasury £1,250,000 per annum. McNaghten was informed of the impossibility of going on at this rate of expenditure. He attempted retrenchment, but the only possible way to enforce it was to cut down the allowances of the chiefs. The very day he attempted this, the chiefs formed a conspiracy for the extermination of the British. The English in Cabool were commanded by Gen. Elphinstone, who had been sent as English envoy in 1835 to counteract the alleged anti-English Perso-Russian intrigues. He was a gouty, irresolute, helpless old man, whose orders constantly contradicted each other. The defences and commissariat were neglected, and everything was in confusion. On Nov. 2, 1841, the insurrection broke out in Cabool. The house of the British resident, Sir Alexander Burnes, was attacked, and he himself murdered. On Nov. 3 the forts near the camp were occupied by the insurgents. On the 9th the commissariat fort, garrisoned by only 80 men, was taken, and the British were thus reduced to starvation. In the middle of November negotiations began, during which McNaghten was murdered in a conference with Afghan chiefs. On Jan. 1, 1842, a capitulation was concluded, the British agreeing to evacuate the country, paying a large amount of money, and surrendering nearly all their artillery and ammunition. The chiefs, on the other hand, promised a safe conduct, provisions, and baggage cattle. On Jan. 5 the British marched out, 4,500 combatants and 12,000 camp-followers. The march, through cold and snow, and with scanty food, soon became completely disorganized, while they were harassed by infuriated Afghan marksmen, armed with long-range matchlocks, occupying every height. The chiefs who signed the capitulation neither could nor would restrain the mountain tribes. The Kurd-Cabool pass became the grave of nearly all the army, and the remnant, less than 200 Europeans, fell at the entrance of the Jugduluk pass. Only one Englishman, Dr. Brydon, reached Jelalabad to tell the tale. Many officers, however, had been seized by the Afghans, and kept in captivity. Jelalabad was held by Sale's brigade. He was summoned to surrender, but refused, and made a most gallant defence; so did Nott at Candahar. Ghuzni had fallen; there was not a man in the place that understood anything about artillery, and the sepoys of the garrison had succumbed to the climate. In the mean time, the British authorities on the frontier, at the first news of the disaster of Cabool, had concentrated at Peshawer the troops destined for the relief of the regiments in Afghanistan, which were long detained by lack of transportation. Gen. Pollock received the command, and at the end of March, 1842, forced the Khyber pass, and advanced to the relief of Sale at Jelalabad; but Sale had a few days before completely defeated the investing Afghan army. It was not till July that Lord Ellenborough, now governor general of India, authorized an advance on Cabool, both from Candahar and Jelalabad; and on Sept. 15 Gen. Pollock, after several battles, encamped under the walls of Cabool. On the 17th he was joined by Nott, who had also fought several battles, and had taken and destroyed Ghuzni. Shah Shujah had long before been murdered by some of the chiefs, and since then no regular government had existed in Afghanistan; nominally, Futteh Jung, his son, was king. Pollock despatched a body of cavalry after the Cabool prisoners, but these had succeeded in bribing their guard, and met him on the road. As a mark of vengeance, the bazaar of Cabool was destroyed, on which occasion the soldiers plundered part of the town and massacred many inhabitants. Oct. 12, the British left Cabool and marched by Jelalabad and Peshawer to India. Futteh Jung, despairing of his position, followed them. Dost Mohammed was now dismissed from captivity, and returned to his kingdom. Thus ended the attempt of the British to set up a prince of their own making in Afghanistan. Dost Mohammed on his return to Cabool was received with ovations as the liberator of Afghanistan both from English and Perso-Russian hostility. As early as 1846 he availed himself of the experience he had gained during his captivity in British India to revive hostilities. Entering into an alliance with his former enemies the Sikhs, he set on foot disturbances in the Punjaub, which were not quelled without much hard fighting. After the battle of Guzerat, however (Feb. 21, 1849), the Sikhs, defeated by the English, were forsaken by the Afghans, and Dost Mohammed with 16,000 of his warriors fled over the Indus. He was not disturbed by the English government, and after having conquered Balkh (1850) and thus consolidated his forces in the north, he even succeeded in 1854 in subduing Candahar, and gaining the supremacy in the southern part of the country. He now concluded an offensive and defensive alliance with England, March 30, 1855; and goaded on by that power, as well as encouraged in his ambition by the death of Yar Mohammed, the ruler of Herat, he became involved in war with Persia (1856), which ended in the evacuation of Herat (July, 1857) by the Persians, and the appointment of Ahmed as sultan of that country. In January, 1857, Dost Mohammed concluded a new treaty with England. In 1860 the sultan of Herat quarrelled with Dost Mohammed's son; but on this occasion, as in the following year, in the complications with the emir of Bokhara, Dost overcame all difficulties by the exercise of his wonted tact and moderation. A new Persian war broke out in 1862; but, supported by his British allies, Dost Mohammed defeated the sultan of Herat and took possession of that city after a protracted struggle, May 26, 1863. Ahmed, the sultan of Herat, and the tool of Persia and Russia, died shortly before the capture of his capital, and Dost himself survived his victory only a few days, his death occurring May 29, 1863. He bequeathed the throne to his son Shere Ali, who was soon embroiled in a bitter contest for the succession with his brothers and nephews, and Afghanistan was plunged again into anarchy. Helpless against the many pretenders to the throne, Shere Ali appealed to the English, but he was regarded by them as an unsafe ally, and Afzul Khan, Shere's half brother, was recognized by Sir John Lawrence, the governor of British India, as the lawful sovereign. Yakub Khan, Shere's son, had succeeded in retaining power at Herat, and sent assistance to his father, who, however, was disappointed in his hope of making the Persians his allies against his antagonists. In October, 1867, however, he succeeded in gathering an army of 17,000 men, chiefly through the monetary assistance accorded to him by the widow of Feis Mohammed of Balkh. On April 1, 1868, he took possession of Candahar, and in January, 1869, he achieved a decided victory at Ghuzni over his half brother Azim and his nephew Abd-ul-Rahman. In July, 1869, the pretenders rose anew on the boundaries of Turkistan; but Azim Khan, the most mischievous of them, died in October, 1869, and the Anglo-Indian government, afraid of Russia, which was all the time accused of a design to use Persian supremacy over Herat for her own designs on India, now came over to the side of Shere Ali. Earl Mayo, the new governor general of India, entered into a formal alliance with him, recognizing him as the legitimate sovereign of Afghanistan. At the instigation of England, the upper Oxus was at the same time fixed upon as the boundary line between Afghanistan and Bokhara (a country virtually ruled by Russian influence), and a treaty to that effect was concluded and signed in January, 1871. By bringing the difficulties between these countries to a close, Great Britain hoped to arrest the progress of Russia. Shere Ali, however, was still distrusted by his kinsmen, the pretenders to his throne. On Sept. 21, 1870, his own son Yakub rose in revolt against his father, because the latter, owing to a palace intrigue, resolved to make his second son Abdullah Jan successor to the throne, in place of Yakub. In March, 1871, the fortress of Gurian fell into the hands of Yakub, and in May he even took possession of Herat. A protracted war between father and son was expected, but through British diplomacy a reconciliation took place in June, in consequence of which Yakub was appointed governor of Herat. (See supplement.)—**Afghan Language and Literature.** Afghan is a Persian word. The term *Vilayet* is applied by the people to their country, and signifies the original land of ancestors. They also designate it as Cabulistan, and by other appellations. The inhabitants call themselves Pushtaneh or Pukhtaneh, according to the two main dialects of their language, the Pukhtu and Pushtu, which are spoken in different parts of the country. The Afghani, notwithstanding its peculiar sounds, retains the essential characteristics of the Iranic group of the Indo-European languages. Mixed with various oriental tongues and written in Persian characters, it reveals the defective cultivation of the people. There is a tradition that Mohammed described the Pukhtu as the language of hell. Previous to the 15th century there does not seem to have existed any literature at all; but since that period there have been several poets, who took the high-flown Persian lyrical writers as their models. Abderrahman of Peshawer was one of the earliest poets. In the 17th century Mirza Khan Ansari and Khushhal Shah Abdali distinguished themselves as Afghan poets; and Ahmed, the founder of the Durrani dynasty, was remarkable for his literary efforts. Writings on historical and religious subjects are extant among the Afghans, but none earlier than within the last four centuries. Raverty published a grammar of the Pukhtu language (London, 1860-'68), and a selection from the poetry of the Afghans (1862). Among valuable works on Afghanistan are Elphinstone's "Account of the Kingdom of Caubul" (London, 1815); Caye, "History of the War in Afghanistan" (1851); Belly, "Journal of his Political Mission to Afghanistan" (1862); and the travels of Connolly, Burnes, Ferrier, and Bellew.

AFIUM KARA-HISSAR (Black Castle of Opium, so called from its extensive trade in opium, which grows in its vicinity), or simply **Kara-hissar**, a city in the Turkish eyalet of Khudavendikiar, in Asia Minor, capital of a sanjak or district, 50 m. S. S. E. of Kutaieh; pop. about 50,000. It is neatly built upon a mountain side, protected by a fortress, which is perched upon a high rock above it. Manufactories of carpets, felts, arms, stirrups, and saddlery are carried on by the inhabitants.

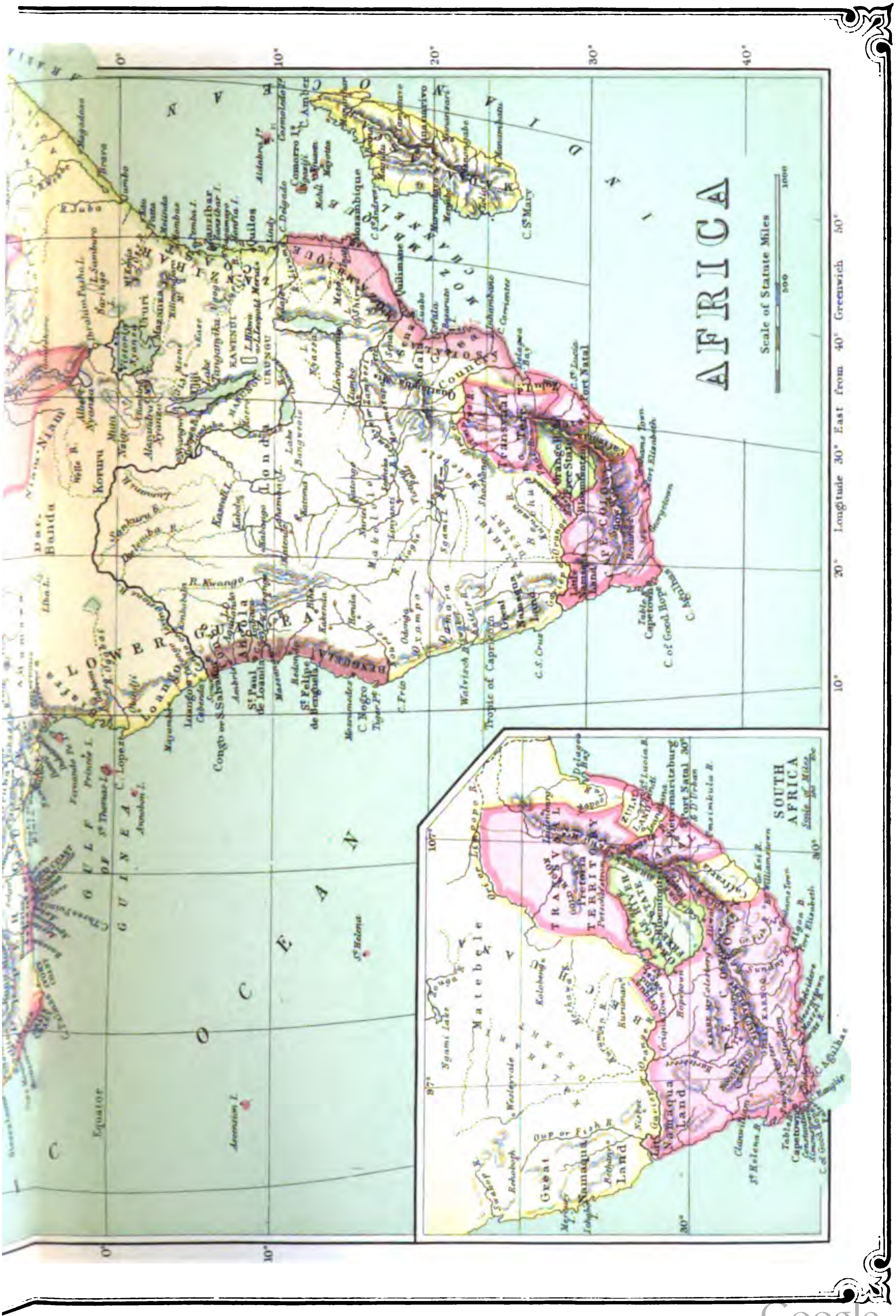
AFRAGOLA, a town of Italy, 5 m. N. E. of Naples, on the railroad to Rome; pop. in 1861, 16,129. It has manufactures of straw hats, and a great annual fair commencing on the second Sunday of May.

AFRANIUS, Lucius, a Roman orator and writer of comedies, who flourished about 100 B. C. His genius and fluent style are praised by Cicero and Quintilian. In his plays he depicted Roman life, and chiefly its lower features, with admirable accuracy, and was therefore regarded as a worthy imitator of Menander. Only some fragments of his works remain.

AFRICA, one of the great continental divisions of the globe, situated in the eastern hemisphere, S. of Europe, from which it is separated by the Mediterranean sea, and S. W. of Asia, with which it was formerly connected by the isthmus of Suez. Since the opening of the canal between the Mediterranean and the Red sea, Africa may be described as an insular continent. It lies between lat. 37° 20′ N. and 34° 50′ S., and lon. 17° 30′ W. and 51° 30′ E., being thus almost wholly within the tropics. Its figure resembles that of an irregular triangle. Its greatest length, measured from Cape Agulhas, E. of the Cape of Good Hope, to Cape Bianco, near Bizerta in Tunis, is 4,330 geographical miles; and its greatest width, from Cape Verd on the Atlantic to Cape Guardafui, on the Indian ocean, is 4,000 geographical miles. The entire area of the continent, exclusive of Madagascar and the other African islands, is estimated at 11,860,000 statute square miles. The derivation of the name, which was originally applied only to the country around Carthage, is uncertain. Within the last 25 years our knowledge of African geography has been so largely increased that the leading physical features of the country are now pretty well known.—Southern Africa is a vast table land, not of great elevation, which on its N. edge slopes down to the rich equatorial plain of Soodan, and thence to the lowland region which constitutes the greater part of northern Africa. The mountain ridges of Senegambia on the west, and the lofty plateau of Abyssinia on the east, are outlying offshoots of the southern table land, stretching forth from it like rocky promontories into a sea of level country. The Atlas range in the northwest is the only other elevated region of importance.—The coast line of Africa is remarkable for its continuity, as well as for its lack of good harbors. It is about 16,000 m. in length, so that for every 710 sq. m. of continental area, according to the estimate above given, there is only one linear mile of coast, a smaller proportion of seashore to surface than in America, Asia, or Europe. The surrounding seas comprise the Mediterranean on the north, the Red sea and Indian ocean on the east, the Southern ocean on the south, and the Atlantic on the west. The island of Madagascar is separated from the S. E. portion of the mainland by the Mozambique channel, 250 m. wide. Just above the equator the breadth of the continent is considerably narrowed by the westward trend of the Atlantic coast through about 15 degrees of longitude, from Cape Palmas to the head of the bight of Biafra, where it resumes its southerly course. The seaboard of this region is washed by the waters of the gulf of Guinea. The most prominent points on the Mediterranean coast are Cape Bon, in Tunis, opposite Sicily, and Cape Spartel, the extremity of a spur from the Atlas mountains forming the African side of the straits of Gibraltar. At the gulf of Sidra, the Syrtis Major of the ancients, in Tripoli, the sands of the Sahara reach the shore; and E. of this locality to the delta of the Nile the coast country is flat and unproductive. In Algeria the Atlas foot hills approach the sea, and the contiguous district is well adapted for cultivation. The Sahara desert again borders the shore on the Atlantic coast of northern Africa; and further S. lie the luxuriant but unhealthy lowland delta districts of Senegambia, whence projects Cape Verd, so named from its rich green covering of gigantic baobab trees. Approaching the equator, these are succeeded by a country still more fatal to man, in the mangrove swamps and reedy shore growths of the Guinea coast. On the Red sea, a range of mountains originating in Abyssinia skirts the W. shore and descends on the north to the lower hills of Egypt, which are geologically connected with the Sinaitic peninsula. The maritime edge of the great South African plateau is bounded for the most part by mountain chains of various altitude, with shelving plains on their seaward slope. Between the E. and W. coasts which border the table land there is a marked difference. Along the Atlantic a series of terraces rises into the interior, intersected in some localities by low, level plains and fever-breeding swamps, and in others by grassy tracts and extensive forests. The highest of these terraces does not exceed 2,000 feet above the sea. From Cape Negro, in Benguela, to the mouth of the Orange river, the coast is a low desert backed by a sandstone ridge, beyond which extends the lofty but no less arid inland region. Along this 900 m. of seaboard there is not a single drop of fresh water, and not a spot of fertility except at Walvisch bay. The coast of Cape Colony is bold and rocky; in Natal the surface rises gradually from the sea to the Drakenberg range, and thence northward to the Zambesi; the shore consists of highlands which in some localities attain the elevation of lofty mountains. Well watered and fertile plains occur opposite Zanzibar, but further N. the country becomes more sterile, and a desert occupies that portion of the continent comprised between lat. 4° N. and Cape Guardafui, its E. extremity. The strait of Bab-el-Mandeb, 20 m. broad, separates Africa from Asia, at the entrance to the Red sea. On the African side the coast is rugged, and rises abruptly from the sea, though only to the height of 380 feet.—Considered with reference to continental location, the mountains of Africa may be classed in five systems, as follows: 1, the mountains of the Mediterranean basin, comprising the three ranges of the Atlas; 2, the mountains of the W. coast; 3, the parallel chains of the Cape region; 4, the mountains of the E. coast; and 5, the Abyssinian group. Isolated from the other parts of the continent by the Great Desert, the Atlas mountains extend across the N. W. portion, from the Mediterranean shores of Tunis to Agadir on the Atlantic coast of Morocco. The Lesser Atlas is the lowest range of this system and nearest the Mediterranean; a little further inland the broad table land known as the Middle Atlas rises still higher; and above this towers the jagged ridge of the Greater Atlas, in many points attaining an elevation of 12,500 ft. It has commonly been represented that these loftier peaks were above the line of perpetual snow; but according to Dr. J. D. Hooker, the English botanist, who succeeded in ascending to the crest of the range near the city of Morocco in 1871, all the snow that falls on fairly exposed surfaces melts in the same year. Several spurs are thrown out from the main chain toward the Sahara, and one trends northward to the straits of Gibraltar. Little is known about the mountains of western Africa, except those in close proximity to the coast. Senegambia includes an elevated region which forms the watershed whence flow the Niger and the Senegal; while in Guinea, N. of the gulf, are the Kong mountains, nowhere exceeding 3,500 ft. in height. The Cameroons rise from the shores of the bight of Biafra, and extend eastward to an unknown distance, with many lofty summits, some of which are estimated at 13,000 ft., though others do not exceed 4,000 ft. We possess but little information as to the mountains which rise back of the terraced W. coast S. of the gulf of Guinea, but there are believed to be extensive ranges of very considerable height. The mountain system of the Cape country is peculiar. The continent is here 700 m. in width, and partly across it stretch three crescent-shaped ranges parallel to the S. coast, and increasing in elevation with their distance from it. The innermost of these ranges borders upon the great interior table land, and between them are narrow tier-like flats, called karroos, forming three gigantic steps ascending from the ocean respectively 2,000, 4,000 and 6,000 ft. above its level. The karroos are connected by defiles known as kloofs, there being no other means of communication between them. The names applied to the different sections of the intervening ranges are numerous. In the southernmost is the Zwellendam group, of which the most prominent height is Table mountain, 3,582 ft. high; to the middle range belong the Zwarteberge, with an average elevation of 4,000 ft.; and on the N. the Roggeveld, Nieuwveld, Sneeuwveld, and others make up the third barrier on the southern edge of the great S. African plateau. The Compass Berg, in the Sneeuwveld, is 10,000 ft. high. The mountains of the E. coast begin with the Quatlamba range, a continuous chain extending between the 27th parallel and the beginning of the delta of the Zambesi, 800 m. from the Mozambique channel, with an elevation varying from 4,000 to 10,000 ft. The Drakenberg is that portion of this range which borders the colony of Natal. At the head of the delta it widens into a belt of fertile highlands, and from this spot other mountain chains branch forth in various directions; one westward, one northward toward Lake Nyassa, and the Lupata mountains southward along the coast of Sofala at a distance of 160 m. from the sea. The northward range is distinguished by no important peak S. of the 4th parallel; but between lat. 3° and 4° S., some 200 m. from the Indian ocean, rises the beautiful snow-capped summit of Mt. Kilimanjaro, 20,065 ft. high, and believed to be the loftiest mountain in Africa. It has lately been partially ascended by the Rev. Charles New, an Englishman, who



MAPS OF
AFRICA; ARABIA;
ABYSSINIA enlarged; LOWER EGYPT;
MADAGASCAR; SOUTH AFRICA enlarged;
Azores; Madeira Is; Canary Is; Cape Verde Is.



AFRICA
Scale of Statute Miles
0 500 1000
Longitude 30° East from Greenwich
10° 20° 30° 40° 50°
GULF OF GUINEA
OCEAN
INDIAN OCEAN
LOWER GUINEA
ANGOLA
BENGUELA
MOZAMBIQUE
ZANZIBAR
MADAGASCAR
Transvaal
Orange Free State
CAPE COLONY
KALAHARI DESERT
Tropic of Capricorn
Equator
St. Helena
Ascension I.
Cape Town
C. of Good Hope
C. Agulhas
SOUTH AFRICA
Scale of Miles
TRANSVAAL TERRITORY
ORANGE RIVER FREE STATE
ZULU LAND
Natal
Namaqua Land
Great Namaqua Land
Matebele
Pretoria
Pietermaritzburg
Port Natal
Port Elizabeth
Delagoa Bay
Ngami Lake

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reached the snow line, and who describes its lower slopes as covered with forests of gigantic trees, above which are rich growths of heath and pasture. About 200 m. further N. Mt. Kenia also rises into the region of perpetual snow, its altitude being estimated at 17,000 ft. A continuous chain is believed to connect this range with Abyssinia. The Abyssinian system of mountains comprises numerous lofty summits clustered in groups on the elevated plateau which separates the Nile basin from the E. African coast. This table land sinks abruptly to the lowlands on the edge of the Red sea, but descends by much gentler gradations on its W. slope. The dividing ridge of the watershed averages 8,000 ft. in height; on the north it is considerably lower, while it ascends to 11,000 ft. on the south. There are said to be peaks over 15,000 ft. high in the Simen range, and in other parts of the country there are known to be many higher than 12,000 ft.—Africa has long been regarded as distinctively and preeminently the country of deserts. The Sahara extends over almost all the northern portion of the continent between lat. 15° and 30° N. With an average width of 1,000 m., and an extreme length of 3,000 m., it stretches from the Nile to the Atlantic, and from the southern slopes of the Atlas to Soodan, covering an area which exceeds that of the Mediterranean, and with a surface in some places below the level of that sea. The southern limits of this vast land of desolation have never been continuously traced by Europeans, and our knowledge of its trackless wastes is confined to the ancient lines of caravan travel across them. The surface is made up of shifting sand, rough gravel, and barren rock, variously distributed, and occasionally traversed by low chains of bare hills. Extensive plains of salt also occur. Throughout this sterile region rain is almost unknown, and the heat is terrific. At the equinoctial seasons the easterly wind, which blows during three fourths of the year, rises at times to a gale, and causes the terrific sand storms by which caravans have so frequently been overwhelmed. The western portion of the Sahara, called Sahel, is the wildest and most desolate; in the eastern portion, to a part of which the name Libyan desert is applied, are numerous oases. These differ greatly in extent, but all contain springs, rich grass, and date palms. Many of them are depressions below the surface of the surrounding desert. Some consist of little more than a well of fresh water, a clump of trees, and a spot of verdure; others cover many miles of fertile country. The more important are: the Great Oasis, or oasis of Thebes, 120 m. long and about 5 m. wide; the Lesser Oasis, smaller but similar in outline; the oasis of Darfoor, constituting the monarchy of a sultan; the oasis of Siwah, in which are the ruins of the famous temple of Jupiter Ammon; and the oasis of Fezzan, with the town of Moorzook as its capital. All of these except the last are situated in a furrow-like depression, parallel to the Nile, intersecting the Libyan desert in its gradual descent toward the Mediterranean. The dreaded wind known as the simoom is a terrible scourge of the desert and the neighboring countries. It is due to the high temperature, sometimes 200° F., attained by the surface sand of the desert under the influence of the vertical rays of the sun pouring down upon it through an intensely dry atmosphere. The furnace-like wind to which this gives rise is rendered still more terrible by the particles of burning sand with which it is impregnated and which tinge the atmosphere with the reddish hue characteristic of the simoom. Burkhardt in 1813 recorded 122° F. in the shade during the prevalence of this pestilential blast, and 114° was observed in 1861 by Sir Samuel Baker. Many other winds of the same class blow from the desert; among them the parching sirocco, which sweeps from northern Africa over Sicily, southern Italy, and Syria; the khamsin, which blows in Egypt for 50 days between the end of April and the summer solstice; the harmattan, which prevails at regular intervals between November and February throughout Senegambia and Guinea, coming from the western Sahara; and the withering N. W. wind which occasionally visits Natal and the Cape. The great desert of southern Africa is the Kalahari, extending from the Orange river on the south to the 20th parallel of S. latitude, and from the pastoral Namaqua district on the west to a strip of pasture land which is believed to border the inland slope of the Quatlamba mountains. Its average elevation above the sea level is only 600 ft. Although termed a desert, the Kalahari is not wholly destitute of vegetation; indeed, light grass, an abundance of tuberous plants, and extensive patches of bushes are found in many localities. Rain seldom refreshes any of these arid tracts; but when it does, they are at once carpeted with the richest verdure.—Before the explorations of Dr. Livingstone, southern Africa was believed to be a sterile wilderness, in the equatorial climate of which the existence of an abundant animal or vegetable life was impossible. In 1852, however, Sir Roderick Murchison, in an address to the royal geographical society of London, advanced the hypothesis that the whole African interior would prove to be a vast watery plateau of some elevation above the sea, but subtended on the east and west by much higher grounds. This view was based purely on geological reasoning, for at that time absolutely nothing was known of the interior N. of Lake Ngami; it was a blank on the map. Livingstone was then engaged in his first expedition on the Zambesi, and its results triumphantly confirmed the correctness of Murchison's speculations. A labyrinthine network of rivers extends over the whole table land between the 10th and 20th parallels, so that the natives call the region Linoka-noka, or "rivers upon rivers." S. of the Kalahari desert the Gariep or Orange river is the only considerable stream.

It flows along the northern boundary of the Cape region westward into the Atlantic ocean, but is not navigable in any part of its course, being an impetuous torrent during the rains, and in the dry season little more than a narrow, slow, and shallow current. Of the rivers which flow into the Indian ocean, the Zambesi or Leambye exceeds all others in magnitude and importance; its name signifies "the river," and indicates its preëminence in the native mind. From its origin among the Gilolo hills to its junction with the Chobe river, in lat. 18° 17′ S. and lon. 23° 50′ E., the general course of the Zambesi is from N. to S., but below this point it flows eastward, making a semicircular bend to the N. on its way to the sea. The area of its drainage basin extends through 10° of latitude and more than 21° of longitude. At the Victoria falls, in lat. 17° 57′ S., lon. 26° 6′ E., the river narrows from a width of 1,000 yards to a gorge-like channel in the rock about 75 ft. broad, and leaps down a distance of 300 ft., forming one of the most magnificent and beautiful cascades in the world. The rising spray forms a constant cloud above the cataract. On the upper portion of the Zambesi the adjacent country is low, and villages are built on raised ground to protect the inhabitant against the annual overflow. Further down, the river is a mile wide in many places. It becomes less rapid after descending the falls, and at the commencement of its delta, 300 m. from the Mozambique channel, it is wide and tranquil. The extreme length of the delta and its shallowness except in the main branch render access from the Indian ocean rather difficult. The Limpopo, which reaches the E. coast about midway between Delagoa bay and the tropic of Capricorn, is a river famed among sportsmen for the gigantic game which haunts its banks, but worthless as an avenue to the interior on account of its deficient depth and the shoals at its mouth. The Congo is the southernmost of the great rivers of Africa which descend from the plateau on the Atlantic side. Of its course or character in the interior we have but little authentic information, although it is supposed to be connected with the Kasai, which is said to traverse a country of alternate forest and pasture land. It is navigable in its lower course, where it is 5 m. wide and of great depth; but at the distance of 160 m. from the sea there is a cataract. The only notable river between this and the delta of the Niger is the Ogowai, which crosses the equator, and enters the sea by the same outlet as the Fernan Vaz. The remarkable facilities which it is altogether probable are furnished by the Niger for direct water communication with the most populous regions of central Africa, render it by far the most important river of the western coast. Precisely where it rises is unknown, but the Bambarra country, among the Kong mountains in Senegambia, about 1,300 ft. above the sea, has been fixed upon as the most probable locality. Its course from its source to the gulf of Guinea is very tortuous, traversing some 15 degrees of longitude, and an estimated distance of 2,500 m., and making a great bend to the north in the vicinity of Timbuctoo. It is variously known as the Niger, the Quorra, and the Joliba. The river Tchadda, from the heart of Soodan, is the largest tributary; below its embouchure the Niger expands to a great width, the distance from bank to bank sometimes exceeding 6 m. The delta through the innumerable streams of which its waters flow into the bights of Benin and Biafra, is equally famous for its luxuriant vegetation and its deadly climate. Rising like the Niger in Senegambia, but draining the western declivity of the watershed of that country, the Rio Grande, the Gambia, and the Senegal find their way to the Atlantic through a wall of coast mountains which forms an obstacle to extended inland navigation on these rivers. The Senegal is the largest, and is more than 800 m. in length. Of all African rivers, however, the Nile is at once the most famous and the most wonderful. It is remarkable physically for the unfailing inundation by which a rainless country is annually fertilized; it is remarkable politically for the early and elaborate civilization which has left imperishable monuments along its valley; and it is remarkable geographically for its vast length, which probably exceeds that of any other river, and for the problem concerning its sources, which remained unsolved until the third quarter of the 19th century. The explorations of Baker have fixed the great Albert lake, which lies directly under the equator, as a proximate source, at least; whether a more remote origin exists can only be determined by future geographical research. The Bahr-el-Abiad, or White river, as the main stream of the Nile is called, issues from the northern extremity of this lake, between lat. 2° and 3° N., at an altitude of 2,720 ft., and flows northward through a mountainous and rocky region, over four cataracts, to Gondokoro, in lat. 5° 54′ N. Here it emerges into a plain and becomes navigable without serious interruption as far as the upper Nubian cataract. Near lat. 9° 30′ N. it receives the tributary Bahr-el-Gazal from the west—an important river, not yet fully explored. The Blue Nile, or Bahr-el-Azrek, from the lofty plateau of Abyssinia, joins the White river at Khartoom; and still further N. it receives the Atbara from the same country. Below this point tropical rains are unknown, and not a single tributary, not even a rivulet, enters the Nile. For more than 1,000 m. it alone irrigates the long green valley which without it would be as barren as the bordering desert. In Nubia it descends over three successive falls, each of which is in reality merely a series of rapids, and which are known respectively as the first, second, and third cataracts, the first named and northernmost being at Syene, on the boundary between Egypt and Nubia, about 700 m. from the Mediterranean and 600 ft. above its surface. The delta begins 90 m. from the sea, by the separation of the river into the Rosetta and Damietta branches. The width of the Nile differs greatly in different sections; there are many places where it is several miles broad. The average velocity of its current is 2½ m. an hour. In Egypt the maximum height of the annual flood is between 30 and 35 ft., and is attained between the middle of September and the middle of October, the river being lowest in April and May.—The lakes of Africa are closely associated with the continental river systems, especially in the case of the Nile. That river proceeds from a region of fresh-water lakes unrivalled except by the great lakes of N. America. Three of these lakes have been visited by Europeans, but no one of them has been completely explored. In 1858 Lake Tanganyika (so called from a native word meaning the meeting place of waters) was discovered by R. F. Burton and J. H. Speke, captains in the British army, whose names have since become famous in the history of African exploration. It is a long and narrow sheet of water, situated between lat. 3° 10′ and 7° 50′ S., with its centre in about lon. 30° E. according to most of the authorities, although Kiepert places it considerably W. of that meridian. Burton estimates its total length at 250 m., its mean breadth at 20 m., and its altitude above the sea at 1,850 ft. Its waters are pure and deep. The Victoria N'yanza, which was seen by Speke in 1858, and subsequently visited by him in company with Capt. Grant, lies some 200 m. N. E. of Lake Tanganyika, with a lofty mountain district intervening. Among its native names are Nyanja, Ukere, and Ukerewe. According to Speke's observations in 1862, its height above the ocean is 3,308 ft. Its northern outlet, which flows over a picturesque cataract called Ripon Falls, in the immediate vicinity of the lake, was believed by Speke to be the veritable White Nile, although he was told by the natives that this stream passed into another vast inland sea, which they called the Luta Nzigé. This statement was confirmed by the discoveries of Sir Samuel Baker and his wife in 1864, when they traversed the eastern shores of the Luta Nzigé—on which they bestowed the name Albert N'yanza—traced its connection with the Victoria lake on the east, and beheld the Nile emerging from it on the north. This vast expanse is embosomed amid noble mountains of great beauty, and is 2,720 ft. above the level of the sea—much lower than the Victoria N'yanza. Its area is unknown, though Baker estimated its width near the northern end at 60 m. Still another lake belonging to this aggregation and called Bahari Ngo, or Baringo, is supposed to lie E. of the Victoria N'yanza. Capt. Burton persistently asserts a belief that the latter will ultimately be ascertained to be, not a single lake, but a vast marshy region of many lakes. Far removed from this system, in lat. 20° 19′ S. and lon. 22° E., is Lake Ngami, about midway between the respective coasts of the continent. It is 3,713 ft. above the ocean, from 50 to 70 m. long, quite shallow, and supposed to be gradually contracting its shores. Livingstone discovered it in 1849, and followed its outlet, the river Zooga, some distance toward the district now known to be watered by the Limpopo. Ten years later Livingstone also discovered the more important Lake Nyassa, which is situated about 300 m. from the E. coast and N. of the Zambesi delta, with which it is connected by the river Shiré. It lies in a valley surrounded by eminences, at a height above the sea of about 1,500 ft. Its width is from 20 to 60 m., and its entire length is estimated at not less than 200 m., although the northern extremity has never yet been visited by white men. Its waters are very deep. In the clear, dry season their surface is ruffled by boisterous southeasterly gales, which render navigation perilous. Shirwa, a much smaller lake than N'yassa, but exceeding it in elevation by about 500 ft., is situated among the mountains on the S. E., 30 m. distant. The principal lake of Abyssinia is Tsana or Dembea, covering an area of 1,400 sq. m. in the centre of a plain over 6,000 ft. in altitude, on which the climate is that of perpetual spring. In the same country is also the beautiful little lake of Ashangi, enclosed on all sides by mountains towering above the plateau on which it rests. The chief body of water in central Africa is Lake Tchad, which is extremely shallow, being only from 8 to 15 ft. in depth. Its area appears to vary somewhat in different seasons. Its elevation above the sea is 840 ft.—The geology of Abyssinia is better known than that of any other single region of Africa. The foundation of the plateau is metamorphic rock extending to a height of some 8,000 ft. above the sea, and surmounted principally by bedded traps, although in a few instances limestones and sandstones are enclosed between these formations. A line of rocks of volcanic origin skirts the Red sea coast, along which there is also a fringe of coral, embracing Massowa and the neighboring islands. The precipitous gorges through which so many of the Abyssinian rivers flow have probably been worn down through the solid rock to their present depth by the ceaseless action of water exerted through enormous periods of time. The ravine of the Tacazze, one of the streams which unite to form the Blue Nile, is 3,000 ft. deep. A firm clay underlies the deserts of N. Africa. On the W. boundary of Egypt limestones occur, and granite, sandstone, and argillaceous slates are found in Nubia. The deltas of all the great rivers are alluvial deposits. The geological structure of the S. African table land, according to Murchison, is unique in having maintained the same terrestrial and lacustrine conditions since the secondary epoch. No fossil bones have been found in this territory except such as belong to species of animals which still inhabit it. There are tertiary rocks at the Mombas mission in Zanzibar, near the mouth of the Zambesi, and at the Cape; but these are coast formations distinct from those of the interior, in which marine fossils have been sought in vain. Every known fact connected with the geology or palæontology of this region indicates that it has remained practically unchanged through ages which have witnessed the rise and fall of other continents. Within its borders all traces of glacial drift are absent; and there are no volcanic mountains except the Cameroons near the W. coast, and Mt. Kilimanjaro, which has probably been inactive since prehistoric times. The precious metals do not seem to be very generally distributed throughout Africa, and, so far as at present known, the mineral productions are neither abundant nor varied. Until the discovery of gold in Australia and California, however, the gold fields of Guinea, in the Kong mountains, were esteemed as among the most important sources of the world's supply. Iron and copper occur in many parts of intertropical Africa, and Livingstone found seams of coal cropping out along the banks of the Zambesi. Salt is said to be plentiful in almost every country on the continent. Extensive diamond fields, producing many stones of fine quality and great size, were discovered in 1867 in the districts N. of the Orange river and near its confluence with the Vaal. Some controversy arose between the authorities of Cape Colony and the government of the neighboring Orange Free State as to which was entitled to exercise jurisdiction over this territory, and was finally settled in favor of the British claim. The diamond called "the Star of South Africa," which was found shortly after the opening of the diggings, was sold in its rough state for £11,500 sterling.—Among the distinguishing features of the fauna of Africa may be noted the numerical preponderance of terrestrial over aquatic species of mammals; the large proportion of quadrupeds exclusively African in their origin or habitat; and the number of gigantic pachyderms. Considered with reference to the geographical distribution of animals, Africa is partially included in each of two great provinces recognized by naturalists: the palæo-arctic region, which comprises nearly all northern Asia and the African continent N. of the Sahara, and the Ethiopian region, containing the remainder of Africa and the whole of Madagascar. The affinities between the existing and fossil animals of S. Africa and India strongly indicate that these now widely sundered countries must once have been connected with each other more intimately than at present. Two of the three known genera of anthropoid apes, the chimpanzee and the gorilla, are found only in Africa. The habitat of the chimpanzee comprehends the whole western region between the Sahara and the Congo river, but that of the gorilla is limited to the tropical delta districts on the Atlantic seaboard near the equator. Baboons, with one or two exceptions about which there is some doubt, are also confined to Africa. Everywhere in Abyssinia is found the great dog-faced baboon (*cynocephalus hamadryas*), remarkable for its long hair. These monkeys traverse the country in bands numbering from 200 to 300, with a venerable male at the head of the line of march. The galagos of Senegal, Gambia, S. Africa, and Sennaar are the continental representatives of the lemurs of Madagascar. Of the rhinoceros there are five African species, all with two horns, and all restricted to the region S. of the Great Desert, the two white species never having been encountered N. of the equator. The range of the elephant (*elephas Africanus*), which differs from its Asiatic congener, and has never been domesticated like him, is similarly limited. Multitudes of hippopotami are met with on the Nile, the Niger, the Senegal, and in nearly all the equatorial rivers and lakes, the animal being peculiar to the continent. Sir Samuel Baker saw immense herds of them in the Albert N'yanza. Among the pachydermata are also the hyrax and the wart hog. In Bornoo, Abyssinia, and the Galla country, the ox is remarkable for the extraordinary size and length of his horns. Buffaloes are numerous, and the Cape variety is quite fierce and formidable. The giraffe or camelopard, perhaps the most singular of African ruminants, and found in no other land on the globe except as a fossil, is a timorous creature of gregarious habits, which roams over the interior beyond the Orange river, in flocks seldom amounting to 100 in number. The zebra and quagga abound in S. Africa. Five sixths of the known species of antelopes are said to be natives of Africa; of these, the most noteworthy are the eland, the springbok, the klipspringer, and the Abyssinian Beni Israel (*A. saltiana*), one of the smallest of antelopes, a specimen measured by Blanford being only 1 ft. 4 in. high at the shoulder. The more ferocious carnivora abound. The lion, although somewhat circumscribed in his range, is still found in the Atlas mountains on the north, and throughout a great portion of the table land. According to Dr. Kirk, every tribe has a name for him. The tiger is not found in any part of Africa, but leopards, panthers, and the smaller cats are common, as also are hyenas, jackals, and foxes. It is worthy of note that the domestic cat is exceedingly rare in Africa. The single-humped camel is the most useful of the domesticated animals, being almost indispensable for the performance of the long desert journeys to which it is so perfectly adapted. Tame goats and several varieties of coarse-wooled sheep are numerous in certain districts. The birds of N. Africa are almost identical with those of Europe, but the ornithology of the torrid section is represented by some forms of uncommon interest, such as the ostrich, the guinea fowl, and the serpent-slaying secretary bird. The ostrich inhabits the deserts and adjacent plains throughout the interior, and is also met with in Arabia, which is the only country of Asia where it occurs.

Innumerable flocks of guinea fowls haunt the underbrush on the river banks within the tropics and on the island of Madagascar. Among the smaller birds are the little honey bird of Cape Colony, several peculiar species of parrots, many magnificently colored kingfishers, and the indicator family, so called from the assertion of the natives that the birds belonging to it invariably lead the follower of their flight to bees' nests. In Egypt is found the sacred ibis of the ancients, and many other water birds frequent the streams and lake basins. Reptiles are everywhere abundant. The proportion of venomous serpents to those which are harmless is greater than elsewhere, and the enormous python of the tropics, corresponding to the American boa, is sometimes 25 ft. long. The true crocodile is found all along the Nile up to an elevation of 4,000 ft. above the sea; lizards and chameleons are also very plentiful. Africa is richer in tortoises than all the other regions of the globe combined. The celebrated tsetse fly of S. Africa, which fortunately is restricted to limited districts, is one of the most noxious of known insects, its bite being inevitably fatal to horses, cattle, and dogs, but, singularly enough, productive of no injury to the mule, the ass, wild animals, or man. The locust from time immemorial has been the scourge of the agricultural territories. The termites, commonly but erroneously called white ants, dwell in dome-like hills of clay, which they raise to a height of ten feet and upward, on the W. coast, being careful to build them above the high-water mark of the yearly floods.—The flora of the northern part of the continent appears to differ essentially from that of the Niger, and the Cape may be regarded as a botanical province differing from them both. A considerable majority of the plants found in the territories bordering the Mediterranean are common to Europe. In all the green places of the desert grows the date palm, with its abundance of rich fruit and grateful shelter. Egypt produces the famous lotus, Senegal the mighty baobab and curious *pandanus candelabrum*, Guinea the valuable oil-yielding palm, and Cape Colony many species of finely colored aloes. Immense tracts of thorny thicket cover the E. frontier of the latter country, and from them is derived the name Bosjesmans or Bushmen, applied by the Dutch boers to the natives who dwell there. Nearly every attempt to introduce the cereals of other zones and regions into tropical Africa has been rewarded with success. Maize, coffee, indigo, rice, and tobacco flourish, and excellent cotton has been raised on artificially irrigated soil in Egypt. The character of the vegetation varies of course with the elevation above the sea and the distance from the equator.—The entire absence of trustworthy statistics is a serious obstacle to a correct estimate of the aggregate population, which has been placed by some authorities as high as 200,000,000, and by others as low as 100,000,000. The ethnological classification of the native races also presents many difficulties, especially since the scientific accuracy of the old division of the human family into the Caucasian, the Mongol Tartar, and kindred groups, has been impeached. Under that system the inhabitants of Africa N. of the 20th parallel of N. latitude were regarded as belonging to the Caucasian variety, which included therefore the Moors, the Arabs, the Berbers, the Copts, and the Egyptians. Except the Abyssinians, who are also said to be of Caucasian origin, all the nations and tribes S. of the same parallel belong to the Ethiopian stock, and exhibit the black color, high cheek bones, thick lips, and woolly hair which distinguish it. They comprise the negroes proper, who occupy Soodan, Senegambia, the Guinea coast, and the interior; the degraded Hottentots and Bushmen; and the tall and warlike Caffres and Gallas. There are many other subdivisions.—Of the political divisions of Africa, Egypt is certainly the oldest. It embraces an area of about 200,000 sq. m., situated on both sides of the Nile N. of lat. 24° N., and since 1517 has been a dependency of the Ottoman empire under the sway of a viceroy, now known as the khedive, who is virtually an independent monarch. The population of the country, including the dominant Turks, is over 5,000,000 according to the Egyptian officials, but in reality is probably much smaller. Alexandria is the chief seaport, and contains 238,000 inhabitants. The Suez ship canal, from Port Saïd on the Mediterranean to the gulf of Suez on the Red sea, was opened in 1869. Cairo, the capital, has a population of 300,000. Mohammedanism is the prevailing religion. The whole northern coast W. of Egypt is denominated Barbary, and comprehends Tripoli, Tunis, Algeria, and Morocco. Tripoli is a tributary province to Turkey, under the rule of a governor general appointed by the sultan, and is situated between Egypt and Tunis, having an area variously estimated at from 61,760 to 105,000 sq. m., and a population of 1,500,000. The capital, bearing the same name, is a seaport town of 30,000 inhabitants. Barca and the oasis of Fezzan are subject to the Tripolitan government. Tunis, the adjoining state on the west, is likewise a Turkish dependency, also with a capital of the same name. It covers 50,000 sq. m., and the population numbers 2,000,000. The city of Tunis is about 13 m. S. E. of the ruins of Carthage. The ruler bears the title of bey. Algeria, formerly called Algiers, is a French colonial province, having been conquered from the Turks in 1830. There are 2,900,000 inhabitants, 200,000 of whom are Europeans. The estimated area is 170,000 sq. m. Morocco, the westernmost and largest of the Barbary states, is an empire under the independent and absolute rule of a sultan, who resides sometimes in the city of Morocco and sometimes in Fez. His dominions extend over more than 200,000 sq. m., with a population of from 3,000,000 to 5,000,000, composed mainly of Moors. Tangier is the leading seaport, and in European wars has frequently been resorted to as a convenient and secure naval station. The W. coast of Africa, from the Sahara to Cape Negro, comprises three divisions known as Senegambia, Upper Guinea, and Lower Guinea, each of which contains a number of native states and various European colonial establishments. Thus the English have Gambia on the river of the same name, with the main settlement at Bathurst; Sierra Leone, a peninsula 18 m. long and 12 m. broad, with a white population in 1867 of 129 persons; Gold Coast, a territory of 6,000 sq. m. in Upper Guinea, with its principal fort at Cape Coast Castle; and Lagos, 250 m. from the Niger, a station established to secure the more complete suppression of the slave trade. The French colonies are: Fort St. Louis, at the mouth of the Senegal river; Goree, just S. of Cape Verd; Grand Bassam, on the Ivory Coast; and Assinie, on the Gold Coast. There are also several Danish and Dutch settlements in Guinea; but by a treaty completed in 1872 the latter were transferred by the government of the Netherlands to the British crown. Liberia, a republic founded for emancipated negroes from the United States, occupies a portion of the coast N. W. of Cape Palmas. The most prominent and powerful native states of Upper Guinea are the Ashantee territory and the kingdom of Dahomey. In Lower Guinea the Portuguese, who occupy many important towns, exercise supremacy over about 300,000 of the inhabitants, and there are also four independent negro sovereignties, Loango, Congo, Angola, and Benguela. Cape Colony is the largest of Great Britain's possessions in Africa, and since 1866 has included British Caffraria, which was formerly under a separate government. It was conquered from the Dutch in 1806, and now extends over an area of about 200,000 sq. m., having a population in 1869 of 566,158 souls, among whom there were 187,439 Europeans. A short railway runs from Cape Town into the interior as far as Wellington. Natal, also an English colony, owes its name to the fact that land was discovered here on Christmas day in 1497 by Vasco da Gama. Its seacoast of 170 m. is penetrated by only one good harbor, which is at D'Urban or Port Natal, and even this will not admit the largest vessels. The Orange Free State and Transvaal Republic are two democratic governments organized by malcontent boers and others who were dissatisfied with the British colonial rule. N. of the Cape countries the E. coast is divided into three parts: Mozambique, under Portuguese dominion; Zanguebar, in which the principal town is Zanzibar, governed by the sultan or imam of Muscat; and Ajan, a wild tract extending to Cape Guardafui and inhabited by the Somauli. Far to the north and west lies Abyssinia, where a debased form of Christianity is generally professed, and has been to some extent the established religion for many centuries. Nubia, which connects Abyssinia with Egypt, has been subject to the viceroy of the latter country since 1822. The population is Mohammedan. Comparatively little is known concerning Soodan, a name which is applied to the vast land of central Africa bounded N. by the Sahara, W. by Senegambia, S. by Upper Guinea and the table land, and E. by Darfoor. Among its kingdoms are Bornoo, Haussa, and Wadai; and the celebrated cities of Sackatoo and Timbuctoo are within its boundaries.—To the ancients all of Africa except Egypt and the northern coast was known as Libya. Herodotus says that an expedition circumnavigated the continent in the reign of Pharaoh Necho, and there are traditions of Carthaginian exploration far inland; but whatever knowledge was gained by these efforts had been lost to the world long before the voyages of those Portuguese navigators of the 15th century who followed the entire coast from Egypt to the Indian ocean, and led the way for the numerous colonies of Portugal afterward established upon it. Vasco da Gama was the most distinguished of these discoverers, and was the first to double the Cape of Good Hope, which he did on Nov. 20, 1497. He continued his voyage in African waters as far as Mombas, and then proceeded to India. Many of the expeditions of the earlier epoch were sent out under various commanders by Prince Henry the Navigator. The French colonization of the W. coast dates from the 17th century; the Dutch East India company founded its first post at the Cape in 1650; and the African company, incorporated by the English parliament in 1750, did not long delay the establishment of trading stations in Guinea. In 1772 Bruce, the Scotch traveller, visited the sources of the Blue Nile, and after exposure to the utmost hardship and greatest danger returned to England to find his plain and truthful narrative discredited on every hand. Mungo Park, also a Scotchman, was killed on his second trip to the Niger in 1806, after reaching Timbuctoo. The important expedition of Denham and Clapperton to Bornoo set out from Tripoli in 1822, and resulted in numerous discoveries. They were the first white men who ever saw Lake Tchad. In a subsequent attempt to trace the course of the Niger up from the coast Capt. Clapperton died at Sackatoo in 1827, having in his two journeys travelled over the entire distance between Tripoli and Cape Coast Castle. Soodan has since been much more thoroughly explored by Barth, Vogel, and Overweg, and the Niger by the brothers Lander, one of whom had been Clapperton's servant. Our earliest knowledge of the S. African interior came from adventurous native merchants who were bold enough to cross from Loanda on the Atlantic to the shore of the Mozambique channel; and since 1849 the almost uninterrupted journeys of Dr. Livingstone over the great plateau have copiously increased our information in regard to it by such discoveries as those of Lake Ngami, Lake N'yassa, and the Victoria falls of the Zambesi. The explorations of Speke, Baker, and Burton have already been mentioned in connection with the sources of the Nile; and the travels of Petherick on the Bahr-el-Gazal, and of Du Chaillu in equatorial Africa, should not be forgotten. Sir Samuel Baker has recently been commissioned by the khedive to destroy the slave trade and extend the authority of Egypt on the upper Nile, and furnished with a military force for that purpose.

AFRICA, Languages of. The languages of Africa fall into five groups: 1. The Semitic idioms of Abyssinia, exhibiting special relations with the Himyaritic of southwestern Arabia, from which region the Abyssinians are unquestionably immigrants, across the strait of Bab-el-Mandeb. One of these idioms, the Ethiopic or Geez, was long a language of literary cultivation, under Christian influence, and possesses a considerable body of literature. More recently, the Amharic, a kindred dialect, has been the official and learned language of the country. 2. The Egyptian and the dialects related with it. Between these and the Semitic there are generally held to exist evidences of an ultimate but exceedingly distant connection. The Berber language (descendant of the ancient Libyan), occupying, except so far as it has been displaced by the Arabic, the whole north of the continent, and a group of dialects south of Abyssinia, of which the Galla is the most prominent member, are the other relatives of the Egyptian. 3. The Hottentot and Bushman dialects, in the extreme south. Bleek has within a few years declared that these are branches of the Egyptian group, and that those degraded communities, almost the lowest and most savage of men, are therefore a fragment from the same stock which produced the culture of Egypt; and many linguistic and ethnological writers have accepted his view, but the most recent authorities reject it. 4. The South African group or family, sometimes called the Caffre, or Zingian, or Bantu. This fills the whole southern part of the continent (except the territory of the preceding group), and is made up of a considerable number and variety of dialects — the Zulu, Sechuana, Suaheli, Mpongwe, &c.—all plainly and closely related. Its most striking peculiarity is its prevailing use of prefixes instead of suffixes; a word without a formative prefix is as rare here as in the older languages of our own family one without a suffix; and the grammatical agreement of words is in their prefixes, or alliterative, instead of in their suffixes, or rhyming. A phonetic peculiarity shared by some of the dialects of this group with those of the preceding is their use of clicks, or sounds made with the tongue by suction, as consonants composing words. 5. There remains a broad band across the middle of the continent, filled with a large number of widely diverse languages—so diverse that between them, for the most part, no connections can be clearly traced; although, as sharing to a certain degree the peculiarity of formation by prefixes with the South African family, they are probably ultimately related with the latter and with one another. Conspicuous among them are the Bornoo, Haussa, Mandingo, Grebo, Yoruban, and Foolah.

AFRICANUS, Sextus Julius, a Christian writer of the 3d century. Though of African birth or descent, he lived in the city of Emmaus, Palestine, of which, in a mission to Rome about 220, he procured the rebuilding after it had been burned. The new city was called Nicopolis. He is said to have been afterward a bishop. He composed a *Chronicon* in five books, commencing with the creation and closing with the year 221 of the present era, fragments of which have been preserved by Eusebius, Syncellus, and others. Two letters by him are also extant.

AFZELIUS. I. Adam, a Swedish naturalist, born in West Gothland, Oct. 18, 1750, died Jan. 30, 1836. He was a pupil of Linnæus. In 1792 he visited the English colony of Sierra Leone, and made some valuable collections illustrating the botany of the west coast of Africa. After his return in 1794 he was secretary of the Swedish embassy at London, and in 1812 became professor of materia medica at Upsal. He wrote several works on botany, and published the autobiography of Linnæus. **II. Arvid August,** a Swedish author, born at Broddetorp, May 6, 1785, died in Enkjöping, Sept. 25, 1871, where he was pastor for 49 years. With Geijer he published *Svenska Folkvisor* ("Swedish Folk Songs," 3 vols., Stockholm, 1814–'15), of which a selection appeared in German (Berlin, 1830). He is also the author of a collection of original poems in the style of the ancient ballads, wrote a tragedy, translated into Swedish the Hervarar Saga and the Sämundar Edda, and prepared with the assistance of Rask an Icelandic edition of the latter. His principal work is *Svenska Folkets Sagahäfder* (1839–'70), ending with Charles XII. Ludwig Tieck wrote a preface to Ungewitter's German translation of the first 3 vols. of this work (*Volkssagen und Volkslieder aus Schwedens älterer und neuerer Zeit*, Leipsic, 1842).

AGA, originally the appellation of an elder brother, now a title of distinction, among the Turks and Tartars. The aga of the janissaries was the commandant of that corps. The title is also given to wealthy men of leisure.

AGADEZ, the capital of the sultanate of Aïr or Asben, Africa, in lat. 16° 40′ N., lon. 7° 30′ E., about 400 m. N. W. of Lake Tchad; pop. about 8,000. It is believed to have been founded at the end of the 15th century by Berbers, as an entrepôt for their commercial intercourse with the capital of the Songhay empire. The principal article of trade was gold, the town having its own standard weight, which still regulates the circulating medium. But the commerce of the present day is inconsiderable, and its chief importance to the world consists in its lying on the most direct road to Sackatoo and contiguous parts of Soodan.

AGADIR, the southernmost seaport town of Morocco, on the Atlantic, in the province of Sûs, 23 m. S. E. of Cape Ghir, in lat. 30° 26′ 35″ N., lon. 9° 35′ 56″ W.; pop. about 600. It has the best harbor in Morocco, and was formerly a large and strongly fortified city; but in a revolt against Sidi Mohammed in 1773 it was captured and nearly destroyed, and the inhabitants were transferred to Mogador. In the 16th century it was held by the Portuguese and called Santa Cruz.

AGAMEMNON, king of Mycenæ, one of the foremost figures in the Iliad, was the son of Atreus according to Homer, but his grandson according to others. He commanded the combined forces of Greece at the siege of Troy. He married Clytemnestra, half sister of Helen, the wife of his brother Menelaus. The Grecian fleet being detained at Aulis, its sailing place, by unfavorable winds, the priest Calchas declared that the gods must be propitiated by the sacrifice of the king's daughter Iphigenia, on account of his having offended Diana by killing her favorite stag. Agamemnon yielded to the will of the gods, but his daughter was saved by Diana. His quarrel with Achilles forms one of the most interesting portions of the Iliad, which opens with an account of it. On his return from Troy he was murdered by his wife, who had formed an adulterous relation with Ægisthus during his absence, and avenged by his son Orestes.

AGAMI (*psophia crepitans*), a bird of tropical America, also termed the gold-breasted trumpeter. It has been classed among the cranes, but subsequently among the pheasants. By Temminck it is classed as the first genus in the order *alectorides*. Its body is about the size of the pheasant, to which it bears some resemblance in its plumage; but it is much higher on its legs, which resemble those of the *grallatores* or wading birds, being naked far above the knee. It has also a long neck, and in all respects, at first sight, has the appearance of a water fowl; but it never visits fens or water margins, frequenting rather the uplands and dry mountains. Its breast is of a beautiful iridescent green and gold, in which, as in the bare space of scarlet skin which surrounds its eye, it resembles the pheasant. Its tail, however, is short, and partially covered by the loose silky plumes of its light-colored scapularies. It is easily domesticated, and becomes attached to its master, whom it will follow about like a dog. Its name of trumpeter (*psophia*) is given on account of its remarkable cry, performed, with the bill closed, by aid of a peculiar conformation of the larynx. The agami, like the rest of the *alectorides*, makes no nest, but deposits its eggs, which are of a light green color, to the number of 10 up to 16, in a hollow place scratched at the foot of a tree. The down remains very long on the young bird, and then changes into long, close, silky plumes.

Agami, or Gold-breasted Trumpeter.

AGANIPPE, in ancient geography, a fountain of Bœotia, near Mount Helicon, flowing into the river Permessus. It was believed to have the power of inspiring those who drank of it, and was sacred to the muses, who hence derived their name Aganippides. In mythology, Aganippe was a nymph, the daughter of the river god Permessus.

AGAPÆ (Gr. ἀγάπη, plur. ἀγάπαι, love; generally used in the plural), feasts of love, originally a simple meal, taken by the primitive Christians, at first in their places of worship and in connection with the eucharist. It usually followed the sacrament, but there is reason to suppose that it sometimes preceded it, especially in the earliest times. Extravagance and disorder seem to have been early introduced at these feasts in some places, and were rebuked by St. Paul in 1 Cor. xi. In the 2d century the eucharist came to be commonly celebrated alone. The agapæ were suspected by the Roman government as scenes of secret intrigue. They were regulated by various councils down to the 9th century, and gradually disappeared. In modern times they have been revived, under the name of love feasts, by the Moravians and Methodists.

AGAPEMONE, or **Abode of Love** (Gr. ἀγάπη, love, and μονή, abode), an establishment at Charlynch, Somersetshire, England, about 9 m. from Taunton, where a number of persons associated themselves together in 1846 under the name of "Family of Love," and under the guidance of several clergymen, the principal of whom are Henry James Prince and a Mr. Starkey, the former allowing himself to be addressed as "the Lord." The prevailing idea of the sect is that perpetual enjoyment is the sole aim of spiritual and material existence. The relations between the sexes, however, are said to be governed by mutual affinities and attractions, but members of the family of love maintain matrimonial unions while the attraction lasts, and polygamy is forbidden. The life at the Agapemone soon became a matter of public notoriety in consequence of a lawsuit for the custody of a child between a Mr. and Mrs. Thomas, two of Prince's converts. In 1859 Prince published his "Journal," in which he states that he considers himself perfect and incapable of further improvement.

AGAPETÆ (Gr. ἀγαπηταί, beloved), in the early church, virgins and widows who, from pious motives, devoted their time to waiting upon ecclesiastics. Men holding the same relations to societies of women were called agapeti. For some time the relation was maintained pure and blameless; but it resulted in immorality, and was condemned and prohibited by several councils.

AGARD, Arthur, an English antiquary, born about 1540, died in London, Aug. 22, 1615. He held the office of deputy chamberlain 45 years. His name headed the list of members of the society of antiquaries formed by Archbishop Parker in 1572, and six important papers by him are included in Hearne's collection (Oxford, 1720). They treat largely of the early organization and manners of England. Agard bequeathed all his manuscripts to his friend Robert Cotton.

AGARDH. I. Karl Adolf, a Swedish naturalist, born at Bastad, Jan. 22, 1785, died in Carlstad, Jan. 28, 1859. In 1807 he was appointed teacher of mathematics in the university of Lund, and in 1812 professor of botany and natural sciences. He was admitted to holy orders in 1816, and was made bishop of Carlstad in 1834. He devoted considerable attention to political economy, and also wrote on theological and other subjects, but his reputation chiefly rests on his botanical works, especially *Systema*, *Species*, and *Icones Algarum* (1824, 1820–'28, and 1828–'35). The greatest part of his "Manual of Botany" (2 vols., Malmöe, 1829–'32) has been translated into German. **II. Jacob Georg,** son of the preceding, born at Lund in 1813, has been since 1854 professor of botany there. His principal work, *Species*, *Genera et Ordines Algarum* (4 vols., Lund, 1848–'63), is regarded as a standard authority.

AGARIC, Mineral, a marly earth, akin in color and texture to the vegetable of that name.

AGARICUS, the genus of fungi which comprises the common mushroom, *A. campestris* (see MUSHROOM), many of the toadstools, and a few poisonous species. The genus is distinguished by the radiating gills bearing the spores on the under side of the pileus or cap. Several hundred species have been described, most of them edible, some easily cultivated.—The name is often applied to the more solid portions of fungi of other families, as the birch agaric, *polyporus betulinus*, which is cut in strips and used to sharpen delicate instruments. From *P. formentarius* amadou is prepared by cutting the fungus into slices and steeping in a solution of saltpetre; it then makes excellent tinder. In medicine several species of *polyporus* were formerly much used as cathartics under the name of agaric, but have given place to better remedies. The powdered pileus of *P. igniarius* is mixed with snuff by the Ostiaks of the river Obi to improve its narcotic properties. Both in the pulverized form and when beaten into thin sheets it is used as lint. When old the polypori often attain a diameter of two or three feet, and become quite hard and woody. An approximate analysis shows much resinous matter and a peculiar substance called fungine (see FUNGI), but less nitrogenous matter than is usual in this order of vegetables. As they grow on the stems of many trees valued for their timber, and as their presence indicates decay, which they hasten by penetrating the wood with their mycelium, the portion answering to roots, it is desirable, in order to stop the progress of decay, to remove the external fungus and destroy the mycelium by a strong solution of sulphate of copper.

AGASIAS, a Greek sculptor of Ephesus, who is presumed to have lived at or before the time of Alexander the Great. The statue now at Rome, known as the "Borghese Gladiator," is his work. It represents a warrior on foot contending with a mounted combatant.

AGASSIZ, Louis John Rudolph, an American naturalist, born in Motiers, Switzerland, on the lake of Morat, May 28, 1807, died in Cambridge, Mass., Dec. 14, 1873. His family was among the Huguenots who were driven from France by the revocation of the edict of Nantes, and took refuge in the Pays de Vaud. For six generations the lineal ancestors of Agassiz have been clergymen. His father was pastor of St. Imier, a Protestant parish in the ancient bishopric of Basel, and removed to Motiers on account of the severity of the climate at the former place; his mother was Mlle. Rose Mayor, the daughter of a physician in the canton of Vaud. She superintended the education of her son Louis until he reached the age of 11, when he was sent to the gymnasium of Bienne, a small town in the canton of Bern. In the mean time his father had removed from Motiers to the little town of Orbe, at the foot of the Jura. Here, during the vacations, the student's attention was drawn to the natural sciences, under the influence of a young clergyman named Fivaz. His studies were first directed to plants. Having studied four years at Bienne, Louis entered the college of Lausanne, where he passed two years, and then went to Zürich in 1824, where he remained two years in the medical school. He continued his medical studies at the university of Heidelberg, devoting himself chiefly to anatomy and physiology under Tiedemann, zoölogy under Leuckart, and botany under Bischoff. In the autumn of 1827 he entered the university of Munich, which had recently been reorganized. Among the eminent men assembled there Agassiz formed intimate friendships. He studied the organization of plants and their geographical distribution with Martius; he lived in the house of Döllinger, with whom he studied the embryonic development of animals; he was intimate with Wagler; with Oken he discussed the principles of classification; with Fuchs he studied mineralogy; and for four successive years he attended all the lectures of Schelling on philosophy. He was the leading spirit in a select circle of young men who met to discuss scientific subjects. This society was called the little academy, and so interesting were the lectures and discussions that the professors were glad to take part in them. When Dom Pedro of Brazil married an Austrian princess, the Austrian and Bavarian governments seized the opportunity of sending to that country a scientific exploring expedition. The naturalists of the expedition were Martius, Spix, Natterer, and Pohl. Agassiz, still a student, had already published a few special papers. On the return of the scientific corps, Martius occupied himself with the publication of his great work on Brazil. The zoölogical portion was intrusted to Spix, but he had not completed it at the time of his death. Martius immediately selected young Agassiz to elaborate the ichthyological department, upon which very little had been done, and the manner in which he accomplished the task placed him at once in the foremost rank of naturalists. These studies and labors diverted him from the profession of medicine, to which he had been destined by his parents. The allowance he had hitherto received from his father, on which, moderate as it was, he had not only subsisted, but had employed a distinguished young artist, Dinkel, was now withdrawn. Agassiz then applied to Cotta, the publisher, who, struck by the value of the materials Agassiz had collected for a "Natural History of the Fresh-water Fishes of Europe," and no doubt impressed with the genius of the young naturalist, enabled him by a timely supply of funds to complete the work. This was his second great undertaking. Meantime he presented himself as a candidate for the degree of doctor of philosophy, which he took at Erlangen, after passing a very severe examination with distinction. In the same year he took at Munich the degree of doctor of medicine, on which occasion he maintained the superiority of woman in a Latin dissertation upon the thesis, *Femina humana superior mari.* The great work on the fresh-water fishes was advancing. After the double examination for degrees, Agassiz visited Vienna, where he prosecuted his studies in the museum, and devoted himself especially to the study of the fishes of the Danube. In that city he became acquainted with the leading naturalists, and particularly Fitzinger. While studying living fishes, his attention was drawn to the fossil species found in the fresh-water deposits of Oeningen and Glarus in Switzerland, and of Solenhofen in Bavaria. Immediately after the completion of the work on the fishes of Brazil, he commenced his researches upon the fossil fishes, and devoted seven years to the study before beginning the publication. This was continued through ten years, and was brought to a close in 1844. In the course of his preparation for this work, Agassiz visited the principal museums of Europe, accompanied by a skilful artist; and so great was the interest felt universally in these researches, and the confidence which the author inspired, that he was allowed to take with him for examination and comparison the most valuable specimens of more than 80 public and private museums, some of which he was permitted to retain from five to ten years. He was enabled to visit Paris and to prosecute his researches in the collections of that capital, by a most disinterested act on the part of a clergyman and friend of his father, Mr. Christinat, who at a later period visited Agassiz in America, and passed some years in his house. This gentleman had just come into possession of a small sum of money, which he offered in aid of his young friend's pursuits. Agassiz at once became acquainted with Humboldt, who was then residing in Paris, and with Cuvier, the eminent naturalist, who had just commenced his work on fishes. The drawings of Agassiz so delighted Cuvier, that he offered to relinquish to the young man all the materials he had himself collected; and from that time to his death he cherished a warm friendship for the Swiss naturalist, and received him in his family on the most intimate terms. In his investigations of the fresh-water fishes, the rivers and lakes of Europe were thoroughly explored by Agassiz, in order to compare those of the different water basins, especially the Rhine, the Rhône, and the Danube, with their tributaries. These investigations had mostly been made while he was still a student in Heidelberg and Munich, during the vacations, when he travelled on foot over the whole of southern Germany and Switzerland. Some time after the death of Cuvier, 1832, Agassiz returned to Switzerland, on the invitation of citizens of Neufchâtel, where preparations were making to reorganize the college. He received the appointment of professor of natural history in that establishment, and began preparations for the publication of the work on which he had been occupied so long. He also extended his researches to other departments of zoölogy. In 1833 he was enabled by the liberality of Humboldt, who had been his devoted friend since the commencement of their acquaintance in Paris, to begin the publication of the great work on the fossil fishes. This is in 5 volumes, with a folio atlas containing about 400 plates. About 1,000 species are described and figured in the natural size, with the colors of their beds, and there are short indications of about 700 more. The discovery and description of so many new species led to the recognition of new types, and an entirely new classification, based chiefly on the characters of importance in the fossils. The great generalizations to which these researches led have stood the test of time, and have been strengthened and extended by later investigations. The geological results of these researches were remarkable. The relative ages of the formations in which the fossil fishes were found were more clearly established by comparisons of their structures. Moreover, the fossil species differ from those now living, and differ in different stages of the same formation, as well as in different formations, leading to the conclusion that our globe has been peopled by a series of creative acts; and, as peculiar species occur in certain regions and not elsewhere, that these creations were not only successive but local, each having assigned to it a natural limit—man alone, and the animals associated with him, forming the exceptions to this last general law. From this general survey Agassiz drew several very important conclusions respecting the relation of the Creator to the universe. The existence of a superior intelligence, whose power alone could establish and sustain such an order of things, he considered to have been established by rigid demonstration, and on a truly scientific foundation. He believed that species do not insensibly pass into each other, but each has its appointed period, and is not connected, except in the order of time, with its predecessor. "An invisible thread, in all ages, runs through this immense diversity, exhibiting as a general result the fact that there is a continual progress in development, ending in man, the four classes of vertebrates presenting the intermediate steps, and the invertebrates the constant accessory accompaniment. Have we not here the manifestations of a mind as powerful as prolific? the acts of an intelligence as sublime as provident? the marks of goodness as infinite as wise? the most palpable demonstration of the existence of a personal God, author of all things, ruler of the universe, and dispenser of all good? This, at least, is what I read in the works of creation." Such is the tone of the closing part of the chapter on classification. Prof. Agassiz visited England several times, and was everywhere received with respect and enthusiasm. The universities of Edinburgh and Dublin conferred on him the degree of LL.D., and the corporations enrolled him among their citizens. He was the guest of Sir Robert Peel, and Lord Egerton, afterward Lord Ellesmere, and Sir Philip Egerton, honored him with a lifelong friendship. Of the eminent naturalists, Buckland, Owen, and Sir Roderick Murchison should be enumerated as among his friends. In 1834 his "Prodromus of the Echinoderms" appeared, which was soon followed by his monographs on that class of animals, in the preparation of which he was aided by Prof. Valentin and Mr. Desor. During this period he continued to collect materials for his "History of the Fresh-water Fishes." He formed a lithographic establishment at Neufchâtel, where the plates for the atlas of this work were executed, and the prints struck off under his own eye. The great expense, however, exhausted his pecuniary resources, and he not only found it impossible to continue it on the original plan, but it entailed upon him a heavy debt, which cost him the labors of many subsequent years to pay off. In the elaboration of some portions of the subject he was assisted by Karl Vogt, a Swiss naturalist, distinguished for his zeal and attainments in zoölogy. The publication of the "Fresh-water Fishes," in 1839–'40, was followed by the *Nomenclator Zoologicus*, containing an enumeration of all the genera in the animal kingdom, with the etymology of their names, the names of those who first proposed them, the date of their publications, &c. This work was founded upon registers, in which Agassiz entered the names of the animals as they occurred in his studies. They were then methodically arranged, the nomenclature of each class being submitted to the revision of naturalists distinguished for their investigations in each special branch. This was accompanied by another extensive and important work, the *Bibliotheca Zoologiæ et Geologiæ*, containing a list of the authors mentioned in the former, with notices of their writings. This work, published at the expense of the Ray society in England, has appeared since the author's residence in the United States, with emendations and additions by H. Strickland and Sir W. Jardine, in 4 large octavo volumes.—From 1836 to 1845 Agassiz spent his summer vacations among the Alps, chiefly engaged in the study of the glaciers and the geological phenomena they produce. The indications of their greater extension in a former period, and the traces they have left upon the surface of the earth, were carefully followed through the countries adjoining Switzerland, as well as England, Scotland, and Ireland. Before him, De Saussure, Venetz, Charpentier, and others, had written upon the glaciers, and the distribution of bowlders over the valley of Switzerland. De Saussure's theory of their distribution referred it to the action of water. The idea of glacial agency in transporting bowlders appears to have originated among the chamois hunters, who had noticed the fact that every year huge masses of rock were moved by glaciers from their original position. This idea was adopted by Venetz, and extended by Charpentier, who explained the distribution of the bowlders throughout the valley of Switzerland, and on the slopes of the Jura, by the extension of glaciers beyond their present limits in a former period. In 1836 Agassiz visited Charpentier, and accompanied him to the glacier of the Diablerets, where he saw the actual transportation of the bowlders by the glacier, and the rounding and polishing of the rocks at its sides. These observations removed his former doubts. It was obvious that such an accumulation of ice as would extend the glaciers from the Alps to the Jura, covering the valley of Switzerland to the depth of more than 2,500 feet, would require a depression of temperature which must have been widely felt, producing similar phenomena over other portions of the earth's surface; that the north of Europe must have been at the same time covered with a similar sheet of ice. Agassiz first announced his glacial theory in a discourse delivered before the Helvetic society in 1837; but in order to investigate the facts more thoroughly, he first visited most of the Alpine glaciers, and then established his headquarters on the glacier of the Aar, where for eight consecutive summers he continued the researches which formed so large a part of his scientific labors in Europe. These researches are embodied in two works. The first, entitled *Études sur les glaciers*, published in 1840, with plates, contains a description of the glacial phenomena and a statement of the author's views of their former extent. The second, published at Paris in 1847, under the title of *Système glaciaire*, contains an account of the investigations made during his last five visits, 1841-'45, upon the mode of progress of the glaciers, and is accompanied by plates and a topographical chart. An excellent and graphic account of these visits and researches is given in a little work by his companion, Mr. Edward Desor, *Excursions et séjours de M. Agassiz et de ses compagnons de voyage dans les glaciers et les hautes régions des Alpes.* After his removal to the United States, Prof. Agassiz occupied himself with investigations of the distribution of the bowlders and the smooth surface of beds of rock over the North American continent, which he also attributed to the action of glaciers, extending from the north. The results of these investigations are chiefly recorded in the volume containing an account of an excursion to Lake Superior.—From 1846 the biography of Mr. Agassiz belongs to the scientific history of the United States. In the autumn of that year he arrived in Boston, from Paris. The object of his visit was, in the first place, to make himself familiar with the natural history and geology of this country, in fulfilment of a mission suggested to the king of Prussia by Alexander von Humboldt, and in the second place to meet an invitation from Mr. John Amory Lowell to deliver a course of lectures in Boston. Eighteen months or two years had been allotted to the first task, and ample means were provided by the Prussian government for that purpose. Soon after his arrival in Boston Prof. Agassiz delivered his first course of Lowell lectures, consisting of a general review of the animal kingdom. These lectures were listened to by audiences of 1,500 to 2,000 hearers, embracing all that was most cultivated in science and letters in the society of Boston and the vicinity. Immediately afterward, by special request, he delivered another course upon the glaciers and the phenomena connected with their former greater extension. Having completed these labors, he visited New York, Philadelphia, and Charleston, to compare the animals of the northern shores with those of the more southern latitudes of this continent. On his return to the north early in the summer of 1847, he met with Prof. A. D. Bache, superintendent of the United States coast survey. Mr. Bache invited him to avail himself of the facilities presented by the operations of the coast survey for the further prosecution of his researches. The offer was so liberal and of such importance in a scientific point of view, that Agassiz could hardly credit his good fortune; and upon being assured that he might without difficulty visit at will every point of the coast in the well-equipped coast survey vessels, he exclaimed that this would decide him to remain to the end of his days in the United States. He spent part of the summer of 1847 on board the Bibb, commanded by Capt. C. H. Davis, on the coast of Nantucket and Martha's Vineyard. The immediate result of this, and a second cruise along the same coast, was several papers upon the medusæ of Massachusetts, and upon a coral found near Holmes's Hole. In the same summer he visited, in company with Mr. J. A. Lowell, Niagara falls and the White Mountains. During the next three winters he delivered courses of lectures before the Lowell institute upon comparative embryology and the successive development of the animal kingdom. At the close of 1847 Mr. Abbot Lawrence founded the scientific school in Cambridge, and a professorship of zoölogy and geology was offered Mr. Agassiz, which he accepted, after having obtained from his government an honorable discharge. He entered upon his duties in Cambridge in the spring of 1848, and at the close of the academic year started with 12 of his pupils upon a scientific exploration of the shores of Lake Superior. The results of this journey are contained in the volume entitled "Lake Superior," the narrative part of which was written by Mr. J. Eliot Cabot, together with the reports of the lectures the professor delivered at the close of each day. Dr. J. Le Conte contributed the account of the coleoptera. In 1848, in conjunction with Dr. A. A. Gould, he published "Principles of Zoölogy," for the use of schools and colleges. From that period Prof. Agassiz devoted his time alternately to teaching and making original investigations. Besides his university lectures, he delivered in the winters courses of lectures in different parts of the country, while exploring its natural history. In these excursions he was accompanied by assistants, and the collections he made are the most complete extant, embracing the whole range of the animal kingdom. In this manner he traversed the country from Lake Superior to the gulf of Mexico, and from the Atlantic coast to the valley of the Mississippi, delivering courses of lectures in Savannah, Mobile, New Orleans, St. Louis, Cincinnati, and many other places, besides those already mentioned. In 1850 he spent the winter upon the reef of Florida, in the service of the coast survey, ascertaining the mode of growth and the direction of the increase of the reef. In the following summer he explored the state of New York with Prof. James Hall, and afterward he visited again the most important localities with his pupils. In 1852 he accepted a professorship of comparative anatomy in the medical college of Charleston, S. C., which he retained for two successive winters, making at the same time a thorough study of the marine animals of that coast, and extending his excursions to Georgia and North Carolina; but finding the climate injurious to his constitution, he resigned the situation, and returned to reside permanently at the north. In 1868 he was appointed a non-resident professor in Cornell university, at Ithaca, N. Y.—From 1855 his attention was largely devoted to the arrangement of the materials collected in these explorations. To form an adequate idea of the extent of his collections, it ought to be known that besides his own efforts, and the assistance he derived from the young men accompanying him everywhere, he was much assisted by the friends he made in every state during his excursions. The collections embrace also the western coast; he regularly received large contributions from California through his brother-in-law, Mr. Thomas G. Cary, Jr., who collected for him extensively there. The results of all these explorations and investigations were to be given in the work entitled "Contributions to the Natural History of the United States." Four volumes out of ten of this extensive work had appeared at the time of his death. The subscription list extended to the unexampled number of 2,500 names, in all parts of the United States; a magnificent support of a purely scientific undertaking, executed on a grand and expensive scale, and an appreciation of the labors of a great original investigator, such as has never before been exhibited to the world.—Prof. Agassiz's eminence as a scientific man was early recognized in Europe. In 1836 he was elected into the academy of sciences in Paris and the royal society of London, and soon after received similar honors from all the other great learned societies in Europe and America. He received from the academy of sciences in Paris the Monthyon prize for experimental physiology, and the Cuvier prize; the Wollaston medal from the geological society of London; and the medal of merit from the king of Prussia. He was a copious contributor to the leading scientific journals of Europe and America, and made numerous communications to the learned societies of which he was an active member. In the United States, his activity was most beneficial in the American scientific association, the American academy of arts and sciences, and the Boston natural history society, the proceedings and transactions of all of which were constantly enriched from his boundless resources. He was a man of great physical vigor, but his constant labors were more than once followed by imperative calls for rest. The vacations of a naturalist are often more productive than the term time of most men, and science lost nothing when in the winter of 1865 he accepted the liberal offer of a Boston merchant, who undertook to provide for the entire expenses of six assistants and the transportation of specimens, if the vacation journey should be to Brazil. The labors of his youth on the great Brazilian collections of Spix had created in him a strong desire to study the fauna of this region, and on the 1st of April, 1865, he started on an expedition whose results are seen in the immense collections now stored in the Cambridge museum. At Rio de Janeiro he was cordially welcomed by the emperor and received all possible assistance from the Brazilian government, a river steamer being assigned for his especial use. After some time devoted to excursions in the environs, during which he settled the disputed question of the existence of drift phenomena in the southern hemisphere, he sailed for Pará, and thence ascended the Amazon to Tabatinga on the Peruvian frontier. Here the party divided, and while Agassiz went down the river again, stopping at Ega or Teffé, Manaos, and other points, to pursue his researches into the ichthyology of the region, some of his assistants continued the exploration of the upper waters. Returning to Rio after a year's absence, he made some interesting excursions among the Organ mountains, and in July, 1866, sailed for the United States. The narrative of this journey, written mainly by Mrs. Agassiz, was published in 1868; and one of his assistants two years later published the geological report of the survey. After his return from Brazil Agassiz made a short excursion to the Rocky mountains. His arduous labors in extending the museum of comparative zoology at Cambridge again showed him the need of rest; and early in December, 1871, he started on a voyage around Cape Horn in the coast survey steamer Hassler, in company with several other men of science, returning in the autumn of 1872. The results of this voyage, undertaken for deep-sea dredging, proved to be of great importance in the study of oceanic faunæ.—The influence of Agassiz upon the scientific development of the United States has been profound and far-reaching. He called into energetic action the minds of a large body of young men of science, who are laboring in every field of investigation with the enthusiasm he inspired in the methods he taught, and whose faithful study contributed largely to the works published by the master.

AGATE (from the river *Achates*, now Dirillo, in Sicily, near which it was found), one of the modifications in which silica presents itself nearly in a state of purity, deposited, not crystalline, but massive and slightly transparent. Agate, onyx, chalcedony, carnelian, sard, chrysoprase, and many others are but varieties, differing only in external form and appearance from each other, of the one family, quartz. When other ingredients, as alumina or oxide of iron, are found associated with the silica, it appears that their presence is never in any fixed proportion, and is therefore regarded as accidental. Agates are distinguished from the other varieties by the veins of different shades of color which traverse the stone in parallel, concentric layers, often so thin as to number 50 or more in an inch. When these stripes alternated, an opaque band with one transparent, the stone was called onyx, from a fancied resemblance to the alternating lines upon the finger nail, from the Greek ὄνυξ. The modern distinction between agate and onyx refers to the direction in which the stone may be cut; when vertical to the stratification, so as to show stripes or bands, it is called agate; and the same stone, if cut parallel with the strata, is termed onyx, and forms the material of the true cameo. The veins of the agate are no doubt produced by successive deposition of one layer of silicious matter upon another, introduced in a sublimated or soluble form into the cavities of the rocks, where the agates are now found. These rocks are mostly amygdaloids, the cavities of which are filled by a variety of minerals. As the rock disintegrates, or wears away by the action of atmospheric agencies, the hard nodules of agate drop out, and are then found upon the surface, or, as is frequently the case, strewn along a sea beach or in the beds of mountain streams. Externally they are rough, and exhibit no appearance of their beautiful veined structure, which is exposed on breaking them, and still more perfectly after polishing. The largest nodules seldom exceed a foot in diameter. Various processes are adopted for increasing the lustre and heightening or darkening the colors of agates. They are boiled in oil, or kept in warm honey, and then dropped into sulphuric acid. The layers being unequally porous, the absorbed carbonaceous matter becomes charred and blackened by the acid, and the white stripes, impenetrable to the oil, appear clearer and brighter by the contrast. Agates are thus made to assume the onyx character, which is desired by the lapidary for the production of cameos and intaglios, in imitation of the antique sculptured gems. In these the figures, whether in relief or intaglio, are of a different color from the ground. Digestion for a few weeks in hydrochloric acid, kept at a moderate heat, gives a beautiful clear yellow color to the streaks that were before a dirty brown. Stones of a reddish hue are greatly improved in brilliancy of color by first thoroughly drying them for weeks in ovens, then dipping in sulphuric acid, heating to full red heat, and afterward slowly cooling. The changes that take place in both these processes are upon the oxide of iron, which is the coloring matter. They may suggest other modes of producing other analogous effects.—Though the varieties of agate are mostly very common minerals in this country, as well as in the old world, those localities only are of interest which have long been famous for their production, and which still furnish all the agates required by commerce. The value of the stones depends upon the work put upon them, which from their extreme hardness is very laborious, and in the sculptured gems requires the greatest patience and skill. Such operations are not yet introduced into the United States, and the agates found everywhere accompanying the trap rocks meet no demand except from specimen hunters. The principal works for cutting and polishing agates are at Oberstein, a small town not far from Mayence, in south Germany. Here are numerous water mills running the coarse stones for grinding down the surface of the agates, and the wheels of soft wood on which they are polished with the powder of tripoli, found in the neighborhood. They are made into trinkets, cups, seals, rings, handles for swords, knives and forks, and small mortars for grinding very hard substances used by chemists.—Moss agate, or Mocha stone, is grayish white or brownish yellow, with peculiar markings of dark metallic oxide, assuming varied fanciful forms. Landscapes, trees, mosses, and animals have been traced in the lines formed by the arborescent deposit of the foreign mineral, chiefly oxides of iron or manganese. The numerous silicious springs of our western territory, at no distant date, have produced these, now generally known as Rocky mountain agates, some of which are of extraordinary beauty and wonderful resemblance, rivalling those in the museums of Europe that for ages have excited the admiration of the curious. Many of the latter, however, are such remarkable likenesses, that they must be regarded as exceedingly ingenious works of art. One in the British museum presents a likeness of the poet Chaucer; another in the church of St. Mark in Venice represents a king's head with a diadem. De Boot, in his treatise *De Gemmis*, describes one which represents the figure of a bishop with his mitre, placed in the centre of a perfect circle. By turning the stone a little another figure appears, and turned still further the figures of a man and woman are seen. Pliny mentions one belonging to Pyrrhus, in which were pictured the nine muses, with their proper attributes, and Apollo in the middle of the figure playing on the harp. While nature has formed remarkable coincidences of resemblance, yet the credulous have been imposed upon by stone engravers, from the 15th century to our own day, by engraving a device on a soft chalcedony, with a uniform depth of cutting, and staining the stone as before described; then grinding off the surface to the depth of their cutting, leaving the stone smooth, but showing stain where the engraved lines had been. The same means were used to heighten natural marks, as well as the more legitimate mode of curving or waving the surface, so as to erase or bring out desired features.—Agate frequently occurs as a geode, or hollow nodule, explained by the theory of gas entering a silicious solution. Change of temperature and pressure account for the crystalline interior, and the various strata are evidently aggregations, usually concentric. The veins of color are sometimes polygonal, when, from resemblance to the angles of a fortress, it is called fortification agate.

AGATHA, Saint, a Christian martyr of Palermo. Her beauty attracting the attention of Quintianus, the pagan governor of Sicily, he made overtures to her. Enraged at their rejection, he subjected her to the most cruel tortures, and she died in prison, Feb. 5, 251.

AGATHARCHIDES, or **Agatharchus**, a Greek geographical writer, a native of Cnidos in Asia Minor, who flourished about 130 B. C., and was guardian to one of the kings of Egypt during his minority. Of his numerous works, fragments of a description of the Erythræan sea alone remain.

AGATHARCHUS, an Athenian artist of the early part of the 5th century B. C., said to have invented scene painting, and to have painted a scene for Æschylus. Scene painting was, however, not generally used until the time of Sophocles.

AGATHIAS, a Byzantine writer of the 6th century, surnamed Scholasticus on account of his extensive legal knowledge, born in Myrina, in Asia Minor. He received his early education at Alexandria, and in 554 went to Constantinople, where he practised as an advocate and won renown as a poet and historian. Of his writings, about 90 poems are extant, as well as a history of the government of Justinian, which was intended for a continuation of Procopius. It was first published in 1594, and afterward with Niebuhr's amendments in 1828.

AGATHOCLES, a Syracusan adventurer and military despot, died in 289 B. C. He was the son of a potter in the Sicilian town of Thermæ, an exile from southern Italy, and in early life worked at his father's trade, then became a leader of banditti, and afterward a soldier under Damas, a prominent Syracusan, with whom he subsequently served as a chiliarch or commander of 1,000 men, in the war with Agrigentum. On the death of Damas Agathocles married his widow, and thereby became one of the wealthiest citizens of Syracuse. He obtained an ascendancy in the democratic party, was twice driven into exile, but returned, and after terrible bloodshed became autocrat of Syracuse in 317 B. C. Debts were abolished, and the property of the rich was confiscated and distributed among the people. He aimed to drive the Carthaginians out of Sicily, and annex the whole island to the state of Syracuse; but he was defeated by Hamilcar, the Carthaginian governor, near Himera, and shut up in Syracuse on the land side. The sea being open to him, he carried the war into Africa in 310, burnt his ships on landing, and obtained many successes over the Carthaginian troops and cities. The subject allies of Syracuse in Sicily revolted, headed by the powerful city of Agrigentum, and placed themselves under command of Dinocrates, a Syracusan Greek. Agathocles hurried home, but achieved nothing decisive in Sicily, and returned to Africa, where he found his troops mutinous from want of pay. His eloquence saved him. Defeated by the Carthaginians, he and his sons fled to the coast, leaving the army to look out for itself (307). The sons were caught and massacred by the troops, who then made terms with the Carthaginians. Agathocles escaped to Sicily, made peace with the Carthaginians, turned his energies against the revolters, defeated them, butchered thousands after they had laid down their arms on promise of amnesty, and took Dinocrates into his service. He next set on foot an expedition against the Bruttii in Italy, laid the Lipari islands under contribution, made himself master of Crotona on the peninsula, and had advanced far toward raising Sicily to a great naval power when he died.

AGATHON, a tragic poet of Athens, a friend of Euripides, born about 447 B. C., died about 400. He won his first dramatic triumph in 416. Aristophanes ridicules his affectations, and brings him on the stage in a woman's dress. Plato and Aristotle speak well of his talents, but the latter remarks the mild, humane spirit of his tragedies as a sign that the vigor of the ancient drama was departing. He went with Euripides to the Macedonian court in 407, and fixed his abode in the palace of King Archelaus. The dinner which Agathon gave to celebrate his dramatic victory was made by Plato the groundwork of his Symposium. Of his writings a few fragments only are extant. Wieland made Agathon the hero of a philosophical novel.

AGAVE, a genus of plants of the order *amaryllidaceæ*, known as American aloes. The plant produces a circle of stiff, erect, fleshy leaves, often 7 to 10 inches long and 5 to 7 inches thick at the base, growing on the top of a short, woody trunk, bearing flowers in a long, terminal, woody spire. There are several species, but only one merits especial notice. The *agave Americana*, American aloe (called *maguey* in South America and *mezcal* in Mexico), has a short cylindrical stem, terminating in a circular cluster of hard, fleshy, spiny, sharp-pointed, bluish-green leaves, each of which lives for many years, so that but few have withered when the plant has arrived at its maturity. It is a popular error that this only occurs at the expiration of a hundred years, when the tree flowers, and again lies dormant, so far as its efflorescence is concerned, for another century. The American aloe varies in the period of its coming to maturity, according to the region in which it grows, from 10 to 70 years. In hot climates, otherwise favorable to its rapid development, it grows quickly, and early attains its perfect state. In colder countries, where it is cultivated as an exotic, it often requires the full period popularly assigned to it before it has attained its maturity. So soon as it does so, it sends forth a stem 40 feet in height, which puts out numerous branches, forming a cylindrical pyramid of perfect symmetry, each crowned with a cluster of greenish-yellow flowers, which continue in perfect bloom for several months. But at whatever period of the plant's existence this occurs, it is never repeated; as soon as the flowers fall, the plant withers and dies. The natural habitat of the American aloe is the whole intertropical region of America, in which it flourishes from the sandy plains on the level of the sea to the table lands of the mountains, at a height of 9,000 to 10,000 feet. In England, the United States, and France, it is a tender greenhouse plant; but in Spain, Italy, Sicily, and the Barbary states, it is perfectly naturalized.—The American aloe is applied to many uses. From its sap, drawn from incisions in its stem, is made *pulque*, a fermented liquor highly esteemed by the Mexicans; and from that, again, is distilled an ardent and not disagreeable, although singularly deleterious spirit, known as *vino mezcal*. A coarse sort of thread is made from the fibres of the leaves, known as the pita flax. The dried flower stems constitute a thatch which is perfectly impervious to the heaviest rain. From an extract of the leaves balls are manufactured which can be made to lather with water like soap; and from the centre of the stem, split longitudinally, a substitute is obtained for a hone or razor strop, which, owing to the particles of silica which form one of its constituents, has the property of speedily bringing steel to a fine edge.

Agave (American Aloe).

AGDE (anc. *Agatha*), a city of southern France, department of Hérault, 95 m. W. of Marseilles; pop. in 1866, 9,586. It lies a short distance from the Mediterranean, on the left bank of the river Hérault, into which the Languedoc canal (canal du Midi) flows at this point. The town is entirely built of basaltic lava from a neighboring mountain. It is the seat of considerable trade with Italy, Spain, and Africa. It was founded by the Greeks of Massilia (Marseilles) about 590 B. C. Alaric II., king of the Visigoths, held a council here in 506.

AGE, any particular period in the existence of organic beings, of collective humanity, of nations, or of the globe. The age of the world has been variously computed by geologists, but nothing positive is known of the real length of time allotted to each period, so strongly marked by changes in the structure of its crust, and in the forms of animals and plants which have left fossil traces of their existence. Many periods of inorganic change, and numerous mutations of animal and vegetable forms of life, are known to have occurred upon our globe before the slightest trace of man appears upon its crust; and hence it is inferred that human life, compared with the inferior forms of animal and vegetable life, is of comparatively recent date. The age of the world, then, has two distinct bearings, one referring to the origin and growth of the earth in its cosmological and geological existence, the other to the origin and history of man and of society upon its surface. Certain periods remarkable for some particular development in the life and progress of the race, or of a nation, are distinguished by particular names, such as the golden age, the silver age, the copper or the brazen age, and the iron age of heathen mythology, the Augustan age of the Roman empire, the Elizabethan age of English history, and the age of steam and iron in the progress of our own time. (See AGES.)—The life of man has been divided into seven ages by Shakespeare, and into four, five, six, seven, or eight, by men of science. Some make four distinct periods only, such as infancy, youth, maturity, decline; others follow more closely each physiological transition, and divide existence into infancy, childhood, boyhood or girlhood, adolescence, virility, maturity, decline, and old age or second childhood. The most natural divisions are those which distinguish the ascending, the culminating, and the declining periods of life. Each of these may be further subdivided according to physiological changes which mark the transitions from one period to another. Infancy, childhood, and boyhood or girlhood mark the first stage of ascending progress from birth to puberty; youth, adolescence, and manhood or womanhood mark the second stage of ascent in the growth and evolution of the powers of life; virility may be applied to the culminating period; and the descending stages of maturity and decline might well be subdivided into lesser and marked periods of transition, as are the two ascending stages. Infancy applies to the first two years of life, during which the first complete set of teeth is developed; childhood to the age, between 2 and 7 or 8, when the first teeth are shed, and a more complete set replaces them; boyhood and girlhood from 7 to 14 or 15, the average time of puberty, which forms a marked transition, closing the first general phase of ascending progress. Here youth, properly defined, begins, and lasts until the age of 20 or 21, when the physical development becomes complete; the bones are firmly set in all their parts; the mind is also more or less developed; and the sexes have attained "majority" in social life. Adolescence is applied to the first period of adult life, from 21 to 28, and manhood to the riper period, from 28 to 35 or 36. The culminating period of physical and mental force combined is termed virility, and this may vary in different individuals, some waxing feebler soon, while others retain all their vigor from 36 to 48. The body then begins to lose its energy, and gradually declines through the descending periods of maturity and old age. The mind may still retain its power, and even acquire more knowledge and experience, but the body will not maintain so vigorous an exercise of thought and nervous action as in former years. The subdivisions of descending life are not so strongly marked, apparently, as those of the ascending phases; but in woman's life there is a critical period called "the change of life," which corresponds inversely to that of puberty. The capability of child-bearing begins with one and ends with the other. The "critical period," however, is not so fixed as that of puberty. With some it occurs at 40 or 42, while with others it extends exceptionally to 50, 55, or 60, and in some rare instances still later, the average being 45. This period of sterility is less marked and regular in man than in woman. Whatever be the length of the descending phase of life in different individuals, the ascending periods are nearly uniform in their average duration. The female sex is usually more precocious than the male, and women average longer lives than men; but that is probably because they are less exposed to accident and danger in the common course of things, for the extreme cases of old age recorded are more numerous in males than females.—Individuals become legally qualified for certain acts at given ages, and these vary in different countries according to the laws and institutions. A child under 10½ years of age is not amenable to the laws of England for serious offences; the parents are responsible for its actions in minor cases. Above that age the offender is responsible, when deemed competent to distinguish between right and wrong. The age of 14 is fixed by the civil law as the age of criminal responsibility; capital punishment, however, was inflicted for murder in 1629 on a boy of 8 years of age, who had most artfully concealed the body of his victim. The oath of allegiance may be taken after 12, and youths of either sex may choose a guardian at the age of 14; but no person under 21 can execute a valid will. The nubile age was fixed by the Roman law at 14 for males and 12 for females, and at these respective ages either sex may in England consent to marriage, with the approval of guardians. By the *Code Napoléon*, the nubile age in France is 18 for males and 15 for females, with the approval of guardians; at 17 a person of either sex may be an executor or an executrix; and at 16 a minor may devise one half of his property. In the United States either sex may choose a guardian at 14; the nubile age is 14 for males and 12 for females. The age of majority, which gives both sexes the free disposal of themselves and their property, and the enjoyment of all civil rights belonging to their sex and condition, is 21 in the United States, Great Britain, and modern European countries generally; but in ancient Rome minority continued till the age of 25.—Some philosophers believe that, under well devised rules of conduct and favorable external conditions, the natural period of human life might be extended to 100 years, in lieu of the "threescore years and ten" of the Bible; and M. Flourens, a French physiologist of high standing, has published a work in which he treats of "human longevity" as dependent upon human prudence mainly, and easily prolonged by care to the limit of 100 years. The ages of the patriarchs before the flood have been a subject of critical dispute. With the exception of Enoch, whom "God took" at the age of 365, they are all represented in the Bible to have lived seven or eight centuries. Methuselah's age was 969, which is the greatest on record. After the deluge life gradually grew shorter. Shem died at 600, Abraham at 175, Isaac at 180, Jacob at 147, Joseph at 110. Commentators who reject the literal interpretation of the statements concerning the earlier patriarchs suppose either that the name of each patriarch denotes a clan or family instead of an individual, or that the sacred biographies are allegorical. History shows that the natural term of life has varied little during some 4,000 years, and the proportion of extraordinary cases of longevity continues much the same at present as it was in former times. The average duration of existence is, however, quite another question; and this varies with the favorable or unfavorable habits of the people with regard to industry, morality, and civilized culture. Nor has latitude or longitude much to do with the duration of life, either with regard to average, or natural, or extraordinary periods; for in all latitudes and longitudes, where natural conditions are otherwise equally favorable, natural, exceptional, and average periods maintain respectively a similar ratio. The average duration of life in Europe, according to statistical calculations, lies somewhere between 26 and 33 years; the highest average occurs in countries where wealth, commerce, and civilization are most generally diffused; the lowest where poverty and ignorance and despotism prevail. These facts have been carefully observed in our times by life insurance companies, as the basis of commercial calculations. In England the rate of mortality is said to be 2¼ per cent. per annum; while in Russia the returns of 1842 gave 3½ per cent. for the mortality of the whole empire, and considerably more than this for certain provinces, including the basins of the Volga, the Dnieper, and the Don. The average duration of life is therefore higher in England than in Russia; but we might probably find as many cases of exceptional longevity in Russia as in England, if statistical returns were made with equal care in the two countries. Comparative longevity has not received as much attention as the averages of mortality and the mean duration of existence in civilized states, but numerous authentic records of individual cases may be found in every nation. Pliny gives some instances of longevity taken exclusively from the region between the Apennines and the Po, as found on the record of the census instituted by Vespasian; and within these narrow limits he enumerates 54 persons who had reached the age of 100 years; 14, the age of 110; 20, 125; 40, 130; 40, 135; and 30, 140 years. In the single town of Valciatium near Placentia, he mentions 6 persons of 110, 4 of 120, and 1 of 150 years of age. Among the ancient philosophers and men of note, not to mention women, we find some cases of comparative longevity. Sophocles is said to have lived 90 years; Zeno, 98; Democritus, 99; Pyrrho, 90; Diogenes, 90; Isocrates, 98; Gorgias and Hippocrates, upward of 100; and numerous other instances of comparative longevity are recorded of ancient Greece and Rome, as well as of modern times and nations. Dr. Van Oven gives 17 examples of age exceeding 150 years; and Mr. Bailey, in his records of longevity, gives a catalogue of 3,000 or 4,000 cases of old age, verging closely on 100 or exceeding it, and not a few of them reaching as high as 150 years. Many of these cases may be more or less satisfactorily authenticated, but there can be no doubt of the occasional prolongation of human life beyond the age of 100, even up to 170, and in at least one instance to 185, the age of Peter Czartan, a peasant of Hungary, who was born in 1539 and died in 1724. But these cases are always exceptional in comparison with the average duration of life, and therefore, as judicious writers have observed, "no fit exponents of the universal natural capacity for life in man." The average, which falls below the natural term, might certainly be raised by due attention to the laws of nature and the known requirements of healthy life in states and cities, families and individuals. The natural term of life differs to some extent, no doubt, in different persons, though not as the natural stature differs in different families; for all men attain to virility about 35 or 40, however slowly they decline into old age. To this extent we may regard the natural term of human development as normal or constant; but some maintain their vigor many years, and then decline most rapidly and die, while others decline slowly and enjoy a long evening of life. This view of the fact might give some plausibility to the theory of continuing for all by artificial means that slow decline which nature, unassisted, manifests in some rare instances; but nothing being known of the causes of such exceptional longevity, nothing can be logically predicated of the possible results of any human scheme for lengthening the descending period of human life.—Little is known of the age of animals, especially the non-domesticated tribes. Some isolated facts, however, have been noted with regard to the age attained by certain birds, fishes, reptiles, elephants, &c. The East Indians believe that the elephant lives about 300 years, and instances are on record of the animals having been kept in captivity as long as 130 years, their age being unknown when they were first taken wild from the forest. Camels live from 40 to 50 years; horses average from 25 to 30, oxen about 20, sheep 8 or 9, and dogs from 12 to 14 years. As a general rule, the larger types of animals live longer than the smaller, in the vertebrated classes, quadrupeds, birds, reptiles, and fishes. Some kinds of birds attain to a great age; the swan has been known to live 100 years; and there are instances on record of the raven having exceeded that age. Birds of prey attain to great longevity; the eagle has survived a century. Parrots have been known to live 60, and as long as 80 years. The gallinaceous tribes live not so long. Pheasants and domestic poultry rarely exceed 12 or 15 years. Reptiles of some kinds live very long. A tortoise was placed in the garden of the archiepiscopal palace of Lambeth in 1633, during the life of Archbishop Laud, and lived till 1753, when it perished by accident. Nothing is known of the age of large serpents, such as the boa, but small batrachians, as the toad, are known to live about 15 years. Fishes, and animals that live in the water, attain in many instances to a great age. The carp has been known to live 200 years. Common river trout have been confined in a well 30 and even 50 years. A pike has been known to live in a pond 90 years; and Gesner relates that in 1497 an enormous pike was caught in a lake near Heilbronn, in Swabia, with a brass ring attached to it, recording that it was put into the lake in 1230. The pike must have lived, therefore, at least 267 years. The ring is still preserved at Mannheim. The age of the whale is known by the size and number of laminæ of certain organs in the mouth, formed of a horny substance, commonly called whalebone. These laminæ increase yearly, and if the mode of computation be correct, they indicate in certain cases that the animal attains to an age of 400 years. Little is known of the age attained by animals of the lower types, such as articulata, mollusca, and radiata. That of insects has received some attention, and it has been remarked that though the first period of life, passed in the grub or caterpillar state, extends to several months or even years, the great majority live but a few days or weeks after the metamorphosis by which they attain to a more perfect form. The ephemera, when it leaves its grub-life in the water, and assumes a higher form and an aërial existence, lives but a few hours, and dies the very day on which it was born into its new life; whence its name, *ephemera*, passing in a day.—The age of the horse in his ascending phase of life is known chiefly by the growth and appearance of the teeth, and more especially of the incisors, commonly called nippers. In each jaw of the horse there are six of these nippers, broad, thin, and trenchant in the foal; while in the adult animal the crowns become flat, and marked in the centre with a hollow disk. The foal or milk teeth appear about 15 days after birth. At 2½ years of age the middle pair drop, and are replaced by the corresponding pair of permanent teeth. At 3½ years the two next, one on each side, are likewise replaced. At 4½ years the two external nippers or excisors drop and make room for the corresponding pair of permanent teeth. All these permanent nippers are flattened on the crown or upper surface, and marked in the centre with a circular hollow pit; this pit is gradually effaced, as the tooth wears slowly down to a level with the bottom. By the degree of this detrition, or wearing of the teeth, the age of the animal is determined up to the 8th year, when the marks are generally quite effaced. The external pair of nippers, however, appearing a year or two after the intermediate pair, preserve their original form proportionately later. The age of a horse may still be determined for a few years, after the 8th year, by the appearance and comparative length of the canine teeth, or tushes; these, however, are sometimes wanting, particularly in the lower jaw, and in mares they are rarely developed at all. The tushes of the under jaw appear at the age of 3½ years, those of the upper jaw at 4. They are sharp-pointed until the age of 6, and at 10 become blunt and long, because the gums begin about that time to recede from the roots of the teeth, leaving them naked and exposed. After this period there are no certain means of determining the age of a horse, but some conjecture may be made from the comparative size, bluntness, and discolored appearance of the tushes.—The age of horned cattle is more readily determined by the growth of the horns than by the growth, succession, and detrition of the teeth. But the horns of oxen, sheep, goats, and antelopes, being hollow and permanent, differ widely in form, structure, and manner of growth from those of the deer tribe. The deer kind shed their horns annually, and, with the single exception of the reindeer, the males alone have horns. At first they have them in the form of simple prickets, without any branches or antlers; but each succeeding year adds one or more branches, according to the species, up to a certain fixed period, beyond which the age of the animal can only be conjectured from the size of the horns and the thickness of the burr or knob at their roots, which burr connects them with the skull. The prickets or first horns of the common stag fall during the 2d year of the animal's life, each one being replaced by one with a single antler, and thence called the fork. This falls during the 3d year, and is replaced by the 3d kind, which has commonly 3 or 4, and sometimes 5 branches. The 4th and following pair have a like number of branches, and the number of antlers goes on increasing in the same manner till the 8th year of the animal's life; after which they follow no fixed rule, but continue to increase in number, particularly near the summit of the horn, where they are sometimes grouped in the form of a coronet, and thence called "royal antlers." The fallow deer, the roebuck, and other species of this genus, present similar examples of development; the number of the antlers increasing in a fixed ratio up to a certain time, beyond which the age, as in the stag, can only be determined by the comparative size of the burr and that part of the shaft or horn from which the antlers grow. In the fallow deer, the prickets of the 2d year are replaced by horns bearing two antlers already indicating the palmated form which afterward distinguishes them from the antlers of other deer. This palm increases in breadth, and assumes an indented form on the superior and posterior borders, and the 4th pair of horns, shed in the 5th year of the animal's life, are replaced by others in which the palm is cloven or subdivided irregularly into distinct parts, assuming in old animals a great diversity and singularity of form. Finally, the horns begin to shrink in size, and are said to end in becoming simple prickets as in the 1st year. The horns of oxen, sheep, goats, and antelopes are hollow and permanent. They consist of a sheath of horn covering a bony core or process of the skull, and growing from the root, where an additional knob or ring is formed each year; and thus the number of these rings is a sure indication of the animal's age. The growth of the horns is not uniform throughout the year, but varies with the seasons. The increase takes place in the spring, and there is no further addition until the following year. In the cow kind, the horns appear to grow uniformly during the first 3 years, and up to that period they are smooth and without wrinkles; but after the age of 3 years, each succeeding year adds a ring to the root of the horn. The age is determined, therefore, in this species, by allowing 3 years for the smooth part of the horn, and 1 for each of the rings, where they exist. In sheep and goats the horns show their first knob or ring in the 2d year, whence the top or smooth part counts for only 1. These peculiarities have not been sufficiently observed in antelopes to give us a rule for determining the age of the animal by the growth and appearance of the horn.—Some plants and trees run their whole career in a year or two, as the families of annual and biennial plants, while a few species of the larger growth of trees live centuries, and even tens of centuries. The oriental plane, the baobab, the chestnut tree, the great *sequoia* of California, and the deciduous cypress are said to furnish individual specimens, the age of which attains to several thousand years; as much, in fact, as 4,000 or 5,000 years or more. Yew trees are reported to flourish in certain cases after a life of 1,500 or 2,000 years. Adanson found trees of the baobab species in Africa which he computed to be 5,150 years of age; and the younger De Candolle reports the deciduous cypress of Chapultepec, in Mexico, to be still older. The baobab of Senegal, measuring 90 feet in girth, and the gigantic *dracæna draco* at Orotava in Teneriffe, which Humboldt classes with the baobab, are supposed to be among the oldest inhabitants of the earth. The famous sweet chestnut trees on Mount Etna, one of which measures 160 feet in circumference, another 70, and another 64, are said to be as old as the baobabs just mentioned; and the oriental plane tree in the valley of Buyukdere, near Constantinople, having a girth of 150 feet and an internal cavity 80 feet in circumference, is deemed as old as any other tree existing. The great *sequoia gigantea* of the Mariposa and Calaveras groves of California, measuring 90 feet in circumference, and attaining a height of over 300 feet, without doubt lives over 2,000 years. Eight olive trees are still to be seen on the mount of Olives, at Jerusalem, which historical documents prove to have existed before the Seljuk Turks took possession of that city, 800 years ago; and the yew trees at Fountain abbey, in Yorkshire, were reported to be old when the abbey was erected, in 1132. They are probably more than 1,000 years of age now; and the old yew tree formerly in Fotheringhill churchyard in Perthshire, and measuring 56½ feet in circumference, was believed to have existed more than 20 centuries. At Ankerwyke house, near Staines, is a celebrated yew tree, older than the meeting of the English barons at Runnymede, in June, 1215, the date of Magna Charta; and many other cases of extreme antiquity are well authenticated with regard to the trees of the yew species. The trunk of the Ankerwyke house yew tree measures 9 feet 3 inches in diameter at 3 feet from the ground, and its branches overshadow an area of 207 feet in circumference. Many oaks have been cut down in the New Forest which presented as many as 300 or 400 concentric rings, each of which denotes a year's growth; and oaks exist much larger in dimensions and of greater age, some exceeding probably 1,200 years. Dr. Plott mentions an oak felled at Norbury which measured 45 feet in circumference. The Broddington oak, in the vale of Gloucester, was 54 feet in girth, and Damory's oak in Dorsetshire 68 feet. The age of the latter was computed to be about 2,000 years. Wallace's oak at Ellersley, near Paisley, in Scotland, is believed to be more than 700 years of age, and is still flourishing. At Trons, in the Grisons, a lime tree measuring 51 feet in girth, planted in 1284, was still existing in 1792, and was therefore known to be nearly 508 years of age; and in 1776 some famous cypresses called *cupresos de la sultana*, in the palace garden of Granada, were reputed to be 800 or 900 years old. An elm tree planted by Henry IV. was standing in the garden of the Luxembourg palace, in Paris, at the commencement of the French revolution, 1789; and others are known to be of more than a century's growth; but it is not well ascertained that they sometimes, as affirmed, attain to the age of 300 years. Bacon's elms, in Gray's Inn walk, London, planted in 1600, decayed prematurely in 1720; and the elms of the long walk at Windsor, planted early in the last century, though still fine trees, are evidently past their prime. The way in which the age of some of these trees has been computed is twofold: first, by comparison with other very old trees, the rate of growth of which was known; and secondly, by cutting out a portion of the trunk from the circumference to the centre, and counting the number of concentric rings that are visible. In exogenous trees, the woody cylinder of one year's growth is divided from the succeeding and preceding by a denser substance, which marks distinctly the lines of separation between each year. The first of these methods is sufficiently trustworthy to give an approximation to the truth, and the second would be still better if care were taken to avoid all cause of error; but Dr. Lindley states in his "Introduction to Botany," that, owing to the extreme inequality of thickness in the annual layers of wood on opposite sides of a stem or trunk, an examination made on the stunted or less developed side only might lead to a miscalculation of the age; the error thus induced being in some cases as much as 60 per cent. or more. There is no good reason to suppose, however, that such mistakes are common, or that the ages of celebrated specimens, authenticated as above, have been obtained by such miscalculations. The palm trees, and some tropical tribes of endogenous plants, are said to attain to an age of 100 or 200 years, and it has been supposed that certain Brazilian cocoanut palms may be as much as 600 or 700 years old; but the method of computing their age is hardly to be relied on. This consists in counting the number of rings externally visible upon their rind, between the base and the summit of the stem, or by comparing the oldest specimens, the age of which is unknown, with young trees, of a known age and like species; but no confidence can be placed in such a method. The date palm, which is best known to Europeans, does not attain to a very great age. The Arabs do not assign to it a longevity exceeding two or three centuries. The mode of growth seems to preclude even the possibility of attaining to a great age, compared with the exogenous class. (See ENDOGENS, and EXOGENS.)

AGEN (anc. *Aginnum*, or *Agennum*), the chief town of the department of Lot-et-Garonne, France, on the right bank of the Garonne, 73 m. S. E. of Bordeaux; pop. in 1866, 18,222. The old quarter of the town is composed chiefly of narrow streets. The houses in the modern quarter are built on the slope of a hill adorned with trees and vineyards. Agen has been the see of a bishop since 347. Among the distinguished natives of the town were Sulpicius Severus, Lacépède, and the younger Scaliger, whose more eminent father Julius removed hither from Verona. The last representative of the troubadours, the poet Jasmin, was also a native and resident of Agen. It is famous for its prunes and its manufacture of serges.

AGENT, in law, a person appointed to perform an act for another. He may be either special or general, or may be appointed either expressly or impliedly. No form of appointment is required. An agent may be created either by deed, or by a simple letter, or by word of mouth. To execute legal instruments, the authority must be equal in value with the instrument to be executed; thus a power to sign and execute deeds must be created by a power under seal. Some persons are agents by the very nature of their business, such as attorneys, auctioneers, bailiffs, brokers, shipmasters, factors, and others. The agent may bind his principal by his acts. Such liability must necessarily be brought within the scope of his authority; thus, the captain of a ship could not bind his owners in the purchase of a piece of land. The agent entering into a contract on behalf of a principal whose name he discloses is protected from personal liability; but, if acting on behalf of a principal unknown, he is himself liable, unless the third party elect to proceed against the principal. A professional agent is bound to exercise due diligence, and to bring a fair degree of skill and knowledge to the discharge of the duties he undertakes. If he be an unprofessional agent, he is still bound to exercise the ordinary judgment of a prudent man in the conduct of his own affairs. The circumstance of his being a gratuitous agent does not alter the liability of the agent to the principal in this respect. The limits of an agent's powers must be determined by the nature of his instructions. If special, he is limited to their strict letter; if general, he must act for the best interest of his principal, and the usages of trade and commerce will have considerable weight in determining the propriety of his conduct. He is bound to give early notice of all occurrences affecting his principal's interests; he is bound to account for funds immediately on their receipt, and even for the usufruct of the same if retained or employed by him; he may not buy from nor sell to his principal, unless by express assent; and in some cases contracts for the benefit of a person acting in a fiduciary capacity are absolutely void. The rights of an agent are to reimbursement of all charges and expenses which he may have incurred in the proper discharge of his duties, and not caused by his own carelessness or negligence. He is also entitled to remuneration of a reasonable character for his services; and lastly, he is entitled to indemnity against the consequences of all acts done by him on behalf of his principal within his powers, provided that such acts are not wrongful to third parties, in which case the agent is personally liable. For the more complete protection of his rights in these respects, he has a lien upon all property of his principal placed in his hands.—The position of third parties may be inferred from the foregoing. The agent may, in his dealings with third parties, bind his principal in all matters fairly within the scope and object of his employment. If he exceed his powers, the third party has no claim whatever on the principal; the claim which the third party may have on the agent must depend on the nature of the case, and in particular on the fact of his principal being disclosed. Public officers, whether acting within their powers or not, are not liable for contracts entered into as such public officers. For wrongful acts and injuries (not of a criminal character) committed by agents, such as trespasses under color of law, or accidents resulting from negligence, the principal may be made liable, provided that the agent's acts be incontestably within the line of his duty. But the perpetrator of a wrong not being entitled, by the policy of the law, to shield himself behind a principal, the agent is liable as well as the principal.

AGES, a term used to designate various epochs in the civilization of the human race. Hesiod mentions five, and Ovid four. The golden age, synchronous with the reign of Saturn, was a period of patriarchal simplicity, when the earth yielded its fruits spontaneously and spring was eternal; the silver age, governed by Jupiter, was a lawless time, in which the seasons were first divided, agriculture took its rise, and men began to hold property in land; the brazen age, or reign of Neptune, was an epoch of war and violence; in the heroic age (omitted by Ovid) the world began to aspire toward better things; and in the iron or Plutonian age, in which Hesiod believed himself to be living, justice and piety had disappeared from the earth. Fichte divided human history into five ages, of which he conceived that we were in the third; while Hegel and Comte reckoned three, placing us in the last.—European archæologists have divided the prehistoric period into the age of stone, so called because men are supposed to have been at that time unacquainted with the use of metals, and to have made their rude implements of the chase and husbandry exclusively of stone; and the age of bronze, when a compound of copper and tin was employed. The recent discoveries among the remains of the lake dwellings of Switzerland have afforded strong confirmation of this theory, and supported the further opinion that the men of stone and the men of bronze were entirely distinct races. To the bronze age succeeded the men of iron. The antiquity of these ages is a matter of conjecture.—The term MIDDLE AGES is applied to the period of several centuries separating the ancient and modern epochs of European history, considered by some as extending from the fall of the western empire in 476 to the discovery of America in 1492; but other nearly synchronous events have been fixed upon for the beginning and end of the period. Properly speaking, there is no middle age in oriental history, but Hallam applies that term, for the Greeks and their eastern neighbors, to the era of Mohammed.—The DARK AGES is a term applied in its widest sense to that period of intellectual depression in the history of Europe from the establishment of the barbarian supremacy in the 5th century to the revival of learning about the beginning of the 15th, thus nearly corresponding in extent with the middle ages. The last of the ancient authors was Boëthius, after whose death, about 524, the decline of literature, prepared during several previous centuries, became inconceivably rapid. The darkest period for Europe generally was about the 7th century. The earliest sign of revival, however, was seen in Ireland as far back as the 6th. In the 10th Italy and England were in a deplorable condition of barbarism, while in France and Germany there was more or less culture, which increased considerably during the 11th. The comparative prosperity of scholastic learning in the 11th and 12th centuries was followed by a relapse in taste and classical knowledge which lasted through the 13th and 14th.

AGESILAUS, king of Sparta, was the son of Archidamus II., and the successor of Agis II. in 398 B. C. He was not the legitimate heir to the throne, but Leotychides, his nephew, being suspected of illegitimacy, was set aside on the death of Agis, by the influence of Lysander, and Agesilaus substituted for him. Agesilaus, having received only the ordinary education of a Spartan citizen, was very popular with the mass of his countrymen, but he was lame and of small stature. Objection was made to him on this ground when Lysander, the conqueror of Athens, proposed him for the succession, and an augur prophesied against him. Lysander replied that a lame-footed king was better than a man who was not of pure Heraclidan blood. Agesilaus submitted to the restraints of a constitutional king and paid court to the ephori. Soon after his accession an expedition against Persia was determined upon. Agesilaus, accompanied by Lysander, accepted the command, and was placed at the head of the council of war. He burst into Asia Minor, 396 B. C., and forced Tissaphernes, the Persian satrap, to beg for a three months' truce, which was sworn to by both parties. It was treacherously broken by Tissaphernes, but kept by Agesilaus from considerations both of principle and policy. After many successes in Asia Minor, he marched his army into the government of the satrap Pharnabazus. In a two years' campaign he brought his troops into the highest state of efficiency, and never allowed them to desecrate the temples of the foreign gods. Having overcome all the satraps in the neighborhood, Agesilaus conceived the gigantic scheme of penetrating to the heart of the Persian empire, and meeting the king of Persia face to face, as Alexander afterward did. The money of the Persian monarch, freely used in Athens and Thebes, had meantime stirred up in Greece itself a coalition against Sparta and her allies, and the ephori sent a messenger to Agesilaus recalling him. He returned from Asia Minor by way of the Hellespont through Thrace, Macedonia, and Thessaly, fighting his way when he was opposed, and making the march in 30 days. Xenophon accompanied him. He met the anti-Spartan allies at Coronea in Bœotia (394), and won a well contested battle, in which he was severely wounded and many of his choice body guard of Spartans were slain. He regretted the Corinthian war, because it weakened in a fratricidal struggle those forces which, in his opinion, should have been turned against Persia. His bitter animosity against Thebes led him to screen and support Phœbidas, the Spartan who treacherously seized the citadel of Thebes; and he also saved the life of Sphodrias, who made an equally unprincipled but less successful attempt upon the Piræus. This conduct to states with which Sparta was at peace united Thebes and Athens, and they jointly declared war against the Lacedæmonians. Agesilaus was not present at the defeat of Leuctra (371), after which his state never regained its ancient ascendancy; but he defended the city of Sparta with success against Epaminondas and his allied army. His son Archidamus soon afterward gained an easy victory over the Arcadians, which revived the drooping courage of the Lacedæmonians. The impoverished condition of Sparta after Leuctra was partly remedied by the benefactions of Agesilaus, who gave up to the state all the money and presents which he had received from various oriental potentates. The last scene of his life was held by the Greeks to have been unworthy of his renown. He agreed to aid Tachos, an Egyptian revolter against the Persian monarch, with a band of Laconian mercenaries. When he landed he slept on the shore on straw and under the open sky, though more than 80 years old. The Egyptians could hardly believe that the ill-clad, mean-looking little old man whom they saw before them was he who once held the destinies of Greece and Persia in his hands. Tachos would not give him the supreme control of the land forces, but offered him the post of second in command after himself. This disgusted the old soldier, and when Nectanabis revolted from Tachos he declared for the former. Nectanabis subjected him to new humiliations, but Agesilaus rescued him from a perilous position, and seated him firmly in power. The Egyptian gave him 220 talents for his services, with which he, in the winter of 361–360, hastened homeward to lay them at the feet of his beloved Sparta, then engaged in war. He never reached home, but died on the coast of Africa, whither he had been driven by a tempest, at the age of about 80, after a reign of 38 years. His body was embalmed in melted wax and taken to Sparta, where he was splendidly buried.

AGGERHUUS, or **Akershuus**, a S. E. bailiwick of Norway, in the diocese of Christiania; area, 2,012 sq. m.; pop. in 1865, 164,804. It abounds in beautiful scenery, mountains, lakes, and waterfalls. The chief trade is in pitch and lumber, with some iron, tallow, and hides. The whole diocese of Christiania was formerly called Aggerhuus.

AGHRIM, or **Aughrim**, a village in the county of Galway, Ireland, 30 m. E. of Galway, famous for the crowning victory of William III. over James II., July 12, 1691. The marquis St. Ruth, a French general, commanded the forces of James, 25,000 strong, while Ginkel led those of William, 18,000. St. Ruth had made able dispositions for the battle, but, jealous of the Irish generals, had kept his plans to himself, and when he was killed by a cannon shot early in the action there was no one to succeed him. The English troops, in spite of the well chosen position of their opponents, compelling them to advance through a deep bog, totally routed them, killing, it is said, 7,000, and taking 450 prisoners, while their own loss was only 1,700 killed and wounded.

AGINCOURT, now **Azincourt**, a village in the department of Pas de Calais, France, 7 m. N. E. of Hesdin, on the plains near which, on Oct. 25, 1415, Henry V. of England, with only 15,000 men, defeated the French army of more than 50,000, sent against him by the dauphin (son of the insane king, Charles VI.) and commanded by D'Albret, constable of France, aided by many famous captains. The battle, which lasted three or four hours, was won chiefly through the superiority of the English archers, who almost annihilated the cavalry of the enemy when these had been drawn, by the excellent strategy of the English, into a swamp that lay between the armies. In this desperate conflict the French lost the dukes of Alençon, Brabant, and Barre, the high constable, grand master, and high admiral of France, the master of the crossbows, above 120 princes of the blood and nobles, and 8,400 belted knights, esquires, and gentlemen of birth; of the lower ranks there fell only 1,600 men. Of the English, there fell only the duke of York, the earl of Suffolk, one knight, one esquire, and about 600 men of all ranks and arms. The dukes of Orleans and Bourbon and the high marshal of France, with 1,500 knights and nobles, were captured, and languished for many years in English prisons.

AGINCOURT, Jean Baptiste Louis George Seroux d', a French archæologist, born at Beauvais, April 5, 1730, died in Rome, Sept. 24, 1814. His reputation rests on a work executed in Rome, entitled *Histoire de l'art par les monuments, depuis sa décadence au quatrième siècle jusqu'à son renouvellement au seizième* (6 vols. folio, with 325 engravings, 1823), to which are added analytical tables by M. Gence.

AGIS, the name of four kings of Sparta.—**Agis I.**, who gave name to the Agid line of the joint kings of Sparta, is of uncertain history, but is said to have reigned about 1,000 B. C., to have deprived the conquered people of Laconia of their equality with the Spartans, and to have made slaves of the revolted Helots (citizens of Helos). The following were all of the Proclid line.—**Agis II.** (427–398 B. C.), son of Archidamus II., was actively engaged in the Peloponnesian war, and repeatedly invaded Attica. His son Leotychides being considered illegitimate, he was succeeded by his brother Agesilaus.—**Agis III.** (338–331 B. C.) reigned at the time of Alexander the Great's expedition into Asia. In the absence of that conqueror, he made an irruption into Arcadia, but was defeated with great slaughter by Antipater, the viceroy whom Alexander had left behind him, and fell fighting.—**Agis IV.** (244–240 B. C.), son of Eudamidas II., having come to the throne when he was but 20 years of age, conceived a liberal system of political and social change. The privileged class, who engrossed all the power of the state, and almost all its wealth, and who were alone entitled to call themselves Spartans, had dwindled down to 700 heads of families, of whom not more than 100 were wealthy. As by the laws of Lycurgus no Spartan citizen could possess more than one lot of land, three fourths of these 100 wealthy proprietors were women, who were not deemed to be affected by the Lycurgian laws, and in whose hands most of the landed estates had accumulated. Agis himself, his mother, and his grandmother were among the wealthiest proprietors. His plan was, that the great proprietors should give up all their estates above the limit prescribed by Lycurgus, and that this surplusage should be divided in this way: 4,500 estates, situated in the districts adjoining the city of Sparta, to be given to the poorer Spartan citizens and the most respectable aliens, and 15,000 estates to be cut out from the outlying portions of Laconia, and bestowed on as many Periœci capable of bearing arms, who were to be admitted to Spartan citizenship; all debts to be cancelled, and the whole community to start with a fresh score. He gained over his mother Agesistrata and his grandmother Archidamia, and afterward his other relatives and private friends. The senate rejected the project by a majority of one, but a public meeting was called, when Agis spoke, and offered to give up his property.

Leonidas, joint king with Agis, who with a majority of the property holders was opposed to the scheme, was soon after condemned and deposed for having married a foreigner and resided in a foreign land. A plot was laid to assassinate him, but Agis protected him, and allowed him to leave Sparta unhurt. The ephor Agesilaus, who was deeply in debt, procured a decree to abolish all debts, and all acknowledgments of debt were publicly burned in the market place; but while Agis was absent in command of an army against the Ætolians, Agesilaus intrigued successfully against the fulfilment of the original design. Leonidas was recalled and reinstated, and Agis fled to a sanctuary. The conservatives, not daring to take his life in a temple, kidnapped him while he stole out to take a bath, and threw him into prison. An impromptu trial was held, and he was hurried to execution. His mother and grandmother shared his fate.

AGLAOPHON, a painter of the island of Thasos, flourished about 500 B. C. He was the father and instructor of Polygnotus and Aristophon. There was a later painter of the same name, probably his grandson.

AGNIEGUE, or **Gagniegue,** the proper name of the Mohawks, one of the Five Nations of the Hotinonsionni or Iroquois. As a tribe they called themselves Ganniagwari, "the She Bear," whence they were termed by the neighboring Algonquin tribes Mahaqua, a name corrupted by the English into Mohawk. The French joined the Canada tribes against them in 1609; but the Dutch made a treaty with them in 1618 at Norman's Kill, which proved lasting, and the English also secured their friendship. Yet French Catholic missionaries won many converts among them, who subsequently contributed to build up their three villages on the St. Lawrence. During the French and English wars they did good service against Canada, but in the revolutionary war the tribe under Brant joined the English and committed great ravages in the American settlements. In 1784 they retired to Grand River, Upper Canada, where they now are. The "Mohawk Radicals" of Bruyas is the fullest published dictionary of their language, though Marcoux's grammar and dictionary are the most complete. Brant translated the "Book of Common Prayer" and a part of the Bible into Mohawk.

AGNANO, a lake between Naples and Pozzuoli, about 60 feet deep. The waters are strongly impregnated with mineral matter, and the lake is probably the crater of an extinct volcano. Tradition says there was formerly a town here, which was destroyed by an earthquake; and some antiquaries conjecture that it was the fish pond of Lucullus, who had a villa in the neighborhood. Mosaics and ruins of baths are found. On the shores of the lake are natural sulphur baths (Stufe di San Germano), useful in gout, rheumatism, &c.; and 100 paces from there is the celebrated Grotta del Cane. (See GROTTO.)

AGNES, Saint, according to ecclesiastical tradition, a Christian martyr, of a noble Roman family, beheaded in the persecution of Diocletian in 303, at the age of 16. Her uncommon beauty had tempted a son of the prætor Symphronius, from whose brutality she was saved by a miracle. He was struck blind, and recovered his sight through her prayers.

AGNES SOREL, mistress of Charles VII. of France, born at Fromenteau, Touraine, about 1409, died in 1450. She was introduced at court in 1431, soon captivated the king, though she for some time resisted his advances, and retained her influence to the last. So remarkable was her life and conduct in her peculiar position, that for some time she enjoyed the warm friendship of Charles's queen, the virtuous Marie of Anjou. It has been generally asserted that to her was mainly attributable Charles VII.'s recovery from the lethargic despair into which he had fallen, in the hopeless state of public affairs after the English victories of Henry V. and the generals who commanded for his infant son. But her luxury and wealth excited the animosity of the court and the people; and after her sudden death suspicions were entertained against the dauphin, afterward Louis XI., of having poisoned her. She had three daughters by the king.

AGNESI, Maria Gaetana, a learned Italian lady, born in Milan, March 16, 1718, died Jan. 9, 1799. She was the daughter of a professor of mathematics at the university of Bologna. From her childhood she spoke Latin with facility, and was also skilled in other dead and living languages. While still very young she was in the habit of maintaining theses at her father's house, 191 of which he collected and published under the title of *Propositiones Philosophicæ* (Milan, 1738). In 1748 she published her *Instituzioni analitiche* (2 vols. 4to), an educational work on the higher mathematics, partly translated into French in 1775. In 1750, her father having fallen sick, she was permitted by dispensation of the pope to take his place as lecturer in the university. She ended her life in a convent.—MARIA TERESA, sister of the preceding, composed the operas of "Sophonisba," "Cyrus in Armenia," and "Nitocris," besides many cantatas.

AGNOËTÆ (Gr. *ἀγνοεῖν*, to be ignorant of), a sect of heretics in the 4th century, followers of Theophronius of Cappadocia, and another in the 6th, of Themistius of Alexandria. The former denied the omniscience of God, and the latter held that the union of Christ's human and divine natures did not make his human nature omniscient.

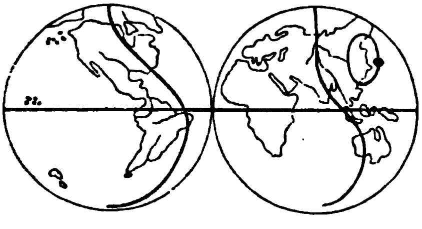
AGNOLO, Baccio d', a Florentine architect, born in 1460, died in 1543. His best works are the Villa Borgherini near Florence, and the campanile of the church of the Santo Spirito in that city. He first introduced the use of frontispieces for the windows and doors of private mansions, which before his time had been confined to church architecture.

AGNONE, a town of S. Italy, province of Molise, 18 m. N. N. E. of Isernia; pop. in 1861, 9,855. It has five *monts de piété*, which make loans of seed corn to the peasants, and is the seat of the principal copper manufactures in the kingdom.

AGNUS DEI. I. In the Roman Catholic church, a cake of wax bearing the image of a lamb holding the banner of the cross, and blessed by the pope. Fragments of such cakes, enclosed in the figure of a heart, are worn around the neck by devout Catholics. II. A cloth embroidered with the figure of a lamb, with which, in the Greek church, the cup at the Lord's supper is covered.

AGOBARD, Saint, a Frankish theologian, born in 779, died June 6, 840. He became archbishop of Lyons in 816, and was deposed by the council of Thionville in 835 for the part he had taken in the revolt of Lothaire against Louis le Débonnaire (833), but was promptly restored, having become reconciled with the emperor. He wrote several controversial theological works against image worship, the belief in witchcraft, and duelling; his principal opponent in discussing these questions was Felix of Urgel. Editions of Agobard's works were published in 1605 and in 1666 in Paris, and a book of his against the Jews was translated into German in 1852.

AGONIC LINE (Gr. *α*, without, and *γωνία*, angle), a word introduced by the modern investigators of terrestrial magnetism, and applied to a line uniting all points where the declination of the compass needle is zero, that is, where it points exactly north and south. As the magnetic poles of the earth do not coincide with the geographical poles, the magnetic meridians are different from the geographical meridians; and as the former are determined by the declination of the compass needle, they are by no means regular arcs of great circles, as is the case with the latter, the magnetic force which directs the compass needle being very irregular over the earth's surface. Therefore the agonic line is not that geographical meridian which passes through the magnetic poles of our earth, but an irregular line at present crossing the eastern portion of South America at about 20° S. latitude and 30° of longitude E. of Washington, skirting the Antilles, entering North Carolina near Cape Lookout, passing over Virginia, Ohio, Lakes Erie and Huron, crossing through the Dominion of Canada, and reaching Hudson bay and the magnetic north pole. At the other side of this pole it passes through the unexplored regions of the geographical north pole till it reaches the northern coast of Siberia in about lon. 115° E. of Washington, and lat. 75° N., passes south through the Caspian sea and the Persian gulf, then bends southeast through the Indian archipelago, crosses the continent of Australia in about lon. 190° E., and then takes a more southern direction to the as yet undiscovered magnetic south pole, beyond which it undoubtedly passes through the south polar regions to unite again with the agonic line in the southern Atlantic ocean. A most perplexing fact is the discovery that there is in the eastern hemisphere a second agonic line, independent of the main one just described. It enters China from the south in lon. 185° E., runs north through Tartary, reaches Siberia in lat. 65° N., then bends toward the east, then southeast, when it enters the ocean; it runs southward over Japan, then southwest, and finally west, and unites with the line entering the south of China. It thus forms a closed elliptical ring, nearly 2,500 m. long and 1,500 m. wide, inside of which the declination of the compass needle is eastward. If the modern theory be correct, that the earth's magnetism is caused by electric currents running from east to west through the earth's crust, and to which, according to the law of Oersted, the compass needle places itself at right angles, these peculiarities would only indicate that the direction of these currents is somewhat irregular, and that they only run exactly east and west at the localities through which the agonic lines have been traced. The most difficult phenomenon, however, is the fact that both this agonic line and the magnetic pole have a slow motion from east to west; in 1580 it ran through Sweden and Germany, in 1620 through Holland, in 1660 through London, England, in 1700 through the western coast of Ireland; it arrived on the American continent about 1780, and in Pennsylvania in 1800; it is now in Ohio, and constantly moves west with a velocity which seems to indicate that, if persisted in, it will make one revolution around the earth in about 600 years. Trustworthy observations, however, extend thus far over too short a period of time to warrant any legitimate conclusion.



AGONISTICI, a sect of Donatist ascetics who inhabited the northern part of Africa in the 4th century. They were opposed to labor, and to marriage as well as to monasticism, which was then just beginning to gain ground. They were mostly rough, uneducated peasants, who begged among the inhabitants, and often destroyed the idols, regardless of the martyrdom which was frequently their reward. They eagerly sought a voluntary death by means of fire or water. Upon the invasion of the Vandals the sect was totally extinguished.

AGOSTA, or Augusta, a seaport town on the E. coast of Sicily, 12 m. N. of Syracuse, and 18 m. S. of Catania; pop. in 1861, 9,223. It is built on a low peninsula in the Mediterranean, and in consequence of its liability to earthquakes, by one of which it was almost totally destroyed in 1693, the houses, with a few striking exceptions, are built low. On the west side of the peninsula it has a commodious harbor, said to be one of the best in Sicily. The knights of Malta at one time had extensive magazines at this port. Agosta has a trade in wine, flax, olive oil, salt, honey, and sardines. The remarkable caves of Timpa are near the town. It was founded in the 13th century by the emperor Frederick II., who destroyed the town of Centuripa and removed its inhabitants hither.

AGOSTINO and **Agnolo** or **Angelo,** two brothers, sculptors and architects, born at Siena about 1269. Educated in their profession by Giovanni, a Pisan architect, they were named architects of their native city, where they constructed many edifices for secular and religious uses. They also executed, from the plans of Giotto, the tomb of Guido, bishop of Arezzo, one of the finest architectural monuments of the 14th century.

AGOULT, Marie Catherine Sophie de Flavigny, countess d', a French authoress, known as Daniel Stern, born in Frankfort-on-the-Main in 1805, died March 5, 1876. Her father, the viscount de Flavigny, emigrated to Frankfort during the revolution. She was educated in Paris, and in 1827 married Count Hector Philippe d'Agoult. She subsequently travelled much in Switzerland, Italy, and Germany, separated from her husband, and lived with Liszt, the pianist, by whom she had children. She was afterward reconciled with her husband (who died in 1856) and regained her social standing in Paris. She wrote a series of novels somewhat after the style of George Sand. Her principal work is *Histoire de la révolution de* 1848 (2 vols., 1851; new edition, illustrated, 1866). She has also published *Trois Journées de la vie de Marie Stuart* (1856), *Florence et Turin* (artistic and political essays, 1862), and *Dante et Gœthe* (dialogues, 1866).

AGOUTI (*dasyprocta* of Illiger; *chloromys* of Cuvier), a genus of animals belonging to the class *mammalia*, order *rodentia*, distinguished principally by their feet and toes, which are furnished with powerful claws, similar to those of the burrowing animals. The agoutis, however, neither burrow nor climb, roaming at large in the forests, and sheltering themselves among any casual defences they may find. They use their fore paws for the purpose of holding their food, sitting erect on their haunches while eating, and assuming the same attitude when looking about them or listening in alarm or surprise. The agouti is of nearly the size of a large hare, and like that animal has its hind legs longer than the fore, but not so disproportionately, for which reason it stands more erect. The common agouti, *D. aguti*, measures about 1 foot 8 inches in length, and stands 11 or 12 inches high at the croup. Its head resembles that of the rabbit; its face is convex; its nose swollen; its upper lip cleft; its ears round and naked; its eyes large; its upper jaw longer than the lower; and its tail a mere naked stump. The hairs on the upper parts are annulated alternately with black, brown, and yellow, producing a speckled yellow and green appearance on the neck, head, back, and sides. The croup is golden yellow; the breast, belly, and inner part of the arms and thighs are straw color; the moustaches and feet black. The hair on the fore parts is about an inch long; on the rump nearly four times that length, whence the generic name of *dasyprocta* (hairy-rumped); and is everywhere, except on the breast and belly, of a stiff and bristly character. These animals inhabit Guiana and Brazil, and are also found in the West India islands, and as far south as Paraguay. On the islands, at the time of their first discovery, they were the largest known quadrupeds, and constituted the principal food of the dense Indian population. It is asserted and denied, by different authors, that they breed many times in each year, and produce many young at each birth; but the great numbers in which they are still found in all the hotter parts of America, in spite of their destruction by the small carnivora and by the Indian races, together with their affinity to the rabbit and cavy, seem to countenance the affirmative proposition. Their flesh is white and tender, and is cooked like that of the hare or rabbit. The other varieties of this animal are the black or crested agouti, *D. cristata*, of Guiana and Brazil; the acouchy, or olive agouti, *D. acuchi*, of the West India isles, Guiana, and the northern parts of Brazil; the white-toothed agouti, *D. croconata*, of the Amazon; the black-rumped agouti, *D. prymnolopha;* the sooty agouti, *D. fuliginosa*, of northern Brazil, easily distinguished by its black color and great size; and, lastly, the Azara's agouti, *D. Azaræ*, of Paraguay, Bolivia, and the south of Brazil. They are perfectly harmless, and appear to form a link between the families of the rabbit and cavy or Guinea pig.

Agouti (Dasyprocta aguti).

AGRA. I. One of the six Northwestern Provinces of British India (which constitute one of the eight separate administrations into which India is divided), lying nearly in their centre; area, 9,479 sq. m.; pop. about 4,500,000, all Hindoos, except nearly 400,000 Mohammedans.

It is watered by the Jumna, Ganges, and Chumbul, is generally flat, almost treeless, and arid, but by irrigation produces good crops of millet and other grains, indigo, cotton, pulse, &c. **II.** One of the six districts or zillahs of the province of Agra; area, 1,865 sq. m.; pop. about 1,000,000. **III.** A city, capital of the preceding province and district, and formerly of the Northwestern Provinces, on the S.W. bank of the Jumna, connected by railway with the principal Indian cities, 115 m. S. S. E. of Delhi and 783 m. N. W. of Calcutta; pop., including the two suburbs and the garrison, about 125,000. It is the centre of an extensive trade, chiefly in cotton, sugar, indigo, salt, and silks. The ancient walls embrace an area of nearly 11 sq. m., about half of which is occupied. Inside Fort Akbar are the palace of Shah Jehan and the famous pearl mosque. Near the river, about 1 m. E. of the fort, is the celebrated Taj Mahal, a mausoleum built by Jehan for himself and his wife Noor Mahal, in the construction of which 20,000 men are said to have been employed 22 years; the cost was estimated at over $4,000,000. It is of white marble, 100 feet in diameter and 200 in height, built in the form of an irregular octagon, and rising from a high marble terrace which rests upon another of red sandstone. At the corners of the marble terrace are lofty minarets, and in the centre of the main building rises a dome, flanked by cupolas of similar form. Both the interior and exterior are decorated with mosaics of precious stones and the most beautiful tracery. The whole Koran is said to be written in mosaic of precious stones on the interior walls. The sarcophagi of Jehan and Noor Mahal lie in the crypt below. Among the European public buildings is the government house, the seat of the lieutenant governor of the Northwestern Provinces, who is sometimes called lieutenant governor of Agra, the province having been at first destined (in 1833) to form a separate presidency.—In the 16th century Agra was embellished and fortified by Akbar, whose tomb is 6 m. from the city. In 1658 the capital was removed to Delhi. From that time the population, then estimated at nearly 500,000, began to decline, but it has increased since the British occupation. In the 18th century Agra was held by various native rulers, and eventually by Madhaji Sindia, the Mahratta chief, patron of the French adventurer Perron, who during the conflict in 1803 with the East India company employed in his turn the Dutch adventurer Hessing. Anarchy prevailed in the garrison, and several Mahratta regiments joined the English forces under Gen. Lake, who occupied the city in September, and the fort in October, 1803. During the sepoy mutiny of 1857 most of the European houses were destroyed. The English and other foreign residents, however, shut themselves up in the fort and sustained a gallant defence until relieved by Col. Greathed.—Agra is venerated by the Hindoos as the city of the incarnation of Vishnu under the name of Parasu Rama.

The Taj Mahal, Agra.

AGRAM (Croat. *Zagreb;* Hun. *Zágráb*), a town of the Austro-Hungarian monarchy, capital of Croatia and of a county of its own name, about a mile from the river Save, and 160 m. S. of Vienna; pop. in 1869, 20,637. It is the residence of the ban of Croatia, and the see of a Roman Catholic archbishop. It carries on an important trade in salt, tobacco, grain, and wines. In its vicinity is one of the finest parks ot the monarchy.

AGRARIAN LAWS, enactments framed at various times by the Romans to regulate the *ager publicus*, or public domain. In the first epoch of the growth of Rome, when the city had not yet extended beyond the Palatine hill, the whole soil of the state was *ager publicus*, or undivided public property; and from the state, or the *populus Romanus*, consisting exclusively of citizens, every citizen received a share for his private use. In principle all the land was, therefore, *ager publicus*, and the citizen could only acquire possession as tenant at will of the state; but in course of time the descendants of the original founders, or the patricians, transformed these primitive concessions into an absolute right, called in the Roman law *de jure quiritio.* Still the principle remained, and was recognized during the whole epoch of the republic, that all lands and booty acquired by conquest were acquired for the state, and could only become the property of individuals through the cession to them of the rights of the state As conquest increased the public possessions, and the class of plebeians was formed, the Roman people gave them lands in the *ager publicus*, as private property, on condition of their paying a tribute, and undertaking other public services; but the patricians always preserved their ancient right of receiving in possession and using parts of the public domain, on paying to the public treasury a tithe of its product. From the first epoch of Roman society, lands thus held could pass as an inheritance to children, and were even sold under this precarious tenure, though in principle the state could always resume their possession. These public lands were also, on their conquest, often transformed into common pasturage. Such lands had various technical names, as *occupati*, *occupatorii*, *concessi*, *arcifinales*, &c.; but the general name was that of *possessiones*, and the payment or tithe given to the state for their use was called *fructus* or *vectigalia.* The possession of all such lands by individuals was permissive, and differed wholly from the absolute right of property, by which each Roman citizen, whether an original patrician or one of the plebeians who were first admitted to private and then to public rights, held landed property by the various titles and denominations known in the Roman law. But the patricians, the original shareholders in the public domain, became by long use accustomed to consider their grants as absolute property, especially as they had improved them in various ways; and accordingly they often refused to pay the tithe due to the treasury. In the early period of the republic, previous to the twelve tables, Spurius Cassius, a patrician, on becoming consul, procured a law that some parts of the public domain, long before conquered, but occupied by the patricians, should be surrendered to the state and assigned to the necessitous citizens. The patricians resisted it, and the law remained a dead letter. The patricians not only prevented new divisions of the public lands, but by violence or usury acquired those of the plebeians. This led to agitation for a revival of the law of Spurius Cassius, which the celebrated decemvir Appius Claudius strongly opposed. Next, the invasion of the Gauls under Brennus ruined the numerous small free tenants and freeholders, and obliged them to sell their landed property to the wealthy patricians. Those among the small freeholds which were not thus absorbed were overwhelmed by the surrounding large estates. The keeping of large flocks of cattle ruined the *saltus publici*, or common pasture lands, and in fact excluded the small farmers from them. This abuse occasioned the publication, in 367 B. C., of the Licinian law (*rogationes Licinia*), so called from Licinius Stolo, its originator. This law is considered as forming the basis and containing the essence of the agrarian idea. The technical name of this law was *De Modo Agri.* It prescribed, under a penalty of heavy fines, that no one should possess more than 500 *jugera* (about 330 acres) of the public domain; and that no one should send to graze on the public pastures more than 100 large or 500 small animals. This law was put in force for a brief period, after which it was neglected for nearly two centuries, when it was renewed by Tiberius Gracchus, with some additions and modifications in favor of the wealthy, who were mostly patricians. Any one having one or two sons could hold from 250 to 500 *jugera* in the public domain above his original right, as established by the Licinian law. The attempt to execute these laws occasioned the tragical end of the two Gracchi (133 and 121 B. C.). In succeeding times, an agrarian law was mooted by a certain Saturninus, having for its object the distribution of lands conquered in Cisalpine Gaul. Another was proposed by Drusus to distribute all the conquered lands among the poor; and in the time of Cicero, Servilius Rullus proposed that the public domains out of Italy conquered by Pompey should be sold, and out of the proceeds lands bought in Italy for needy citizens. Not one of all the Roman agrarian laws was ever executed, and not one of them had that confiscatory or levelling character so frequently attributed to them. Not one of these laws aimed at the equal division of landed property owned by individuals in their own absolute right, or intended any limitation upon such ownership.

AGREDA, Maria de (Coronel), a Franciscan nun, lady superior of the convent of the Immaculate Conception (founded by her mother) at Agreda, in Spain, born in that town in 1602, died there, May 24, 1665. She professed to receive revelations direct from heaven. At the command of God, who appeared to her in a dream, as she said, she undertook to write the life of the Virgin Mary. It was first published in 1690, under the title *Mistica Ciudad de Dios* (4 vols.). Every word, according to her attestation, had been written under inspiration. The reading of it was forbidden at Rome, and the Sorbonne in Paris censured the individual who translated a portion into French. Bossuet exposed the indecencies of the work. It has been translated into German.

AGREEMENT. See CONTRACT.

AGRIB, Agreeb, or Gharib, Mount, a remarkable conical mountain in central Egypt, in lat. 28° 12′ N., lon. 32° 42′ E. It is situated about 16 miles inland from the gulf of Suez, opposite Mt. Sinai, is about 6,000 feet high, and can be seen at a distance of 100 miles.

AGRICOLA, Cneius Julius, a Roman general, born at Forum Julii (now Fréjus in Provence), June 13, A. D. 37, died Aug. 23, 93. He received his education at Massilia (Marseilles), and his military training under Suetonius in Britain. On Vespasian's election by his legions (69), Agricola, then quæstor in Asia, was one of the first to acknowledge him, and that emperor in gratitude appointed him governor of Aquitania. He was next made consul, and subsequently governor of Britain. During this governorship he conquered Wales and the island of Anglesea, built a wall from the Clyde to the frith of Forth to keep off the incursions of the northern barbarians, and defeated the British Galgacus in Scotland, and thus brought Britain under complete subjection. The Roman fleet now for the first time sailed round the whole island. He was recalled by Domitian, and lived in retirement till his death, which was attributed to the emperor's jealousy of his military reputation and popularity. His daughter Domitia married Tacitus the historian, who wrote his life.

AGRICOLA. I. Georg, a German mineralogist and physician, born at Glauchau, Saxony, March 24, 1490, died in Chemnitz, Nov. 21, 1555. His name was originally Bauer (peasant), of which he adopted the Latin equivalent. He was at first rector of a school in Zwickau, afterward studied medicine at Leipsic, devoted himself to metallurgy, and in 1531, on the invitation of Duke Maurice, settled at Chemnitz. He attempted to reduce mineralogy and metallurgy to a science, and introduced considerable improvements in the previously rude art of mining. He first made chemical analyses of the different earths. His mind was, however, deeply tinged with the superstitions of his age. Having renounced Protestantism before his death, his body was refused burial in Chemnitz. He wrote *De Re Metallica*, *De Ortu et Causis Subterraneorum*, and *De Mensuris et Ponderibus Romanorum atque Græcorum*. **II. Johann Friedrich,** a German musician and composer, born near Altenburg, Jan. 4, 1720, died in Berlin, Nov. 12, 1774. He studied music under Sebastian Bach, was chapelmaster of Frederick the Great, and wrote several operas, among them "Iphigenia in Tauris." He was husband of the vocalist Mme. Molteni. **III. Johannes** (originally SCHNITTER or SCHNEIDER), a German theologian, born in Eisleben, whence he is called Magister Islebius, April 10, 1492, died in Berlin, Sept. 22, 1566. He studied at Wittenberg and Leipsic, and acquired the friendship and esteem of Luther, who in 1525 sent him to Frankfort-on-the-Main, to institute Protestant worship there. On his return he was parish priest of Eisleben, and here he commenced that Antinomian controversy which he subsequently renewed from his professorial chair in Wittenberg (1536–'8), and for which he was dismissed from that university. He next became chaplain and general superintendent to the elector of Brandenburg. He wrote several theological works, as well as an account of the common German proverbs. **IV. Rudolf,** an eminent scholar, born in Groningen in 1442 or 1443, died in Heidelberg, Oct. 28, 1485. He travelled in France and Italy, and won the esteem and patronage of Ercole d'Este, duke of Ferrara. On his return he was chosen professor of philosophy at the university of Heidelberg. He wrote various works of a miscellaneous character, the most remarkable of which, perhaps, is an essay entitled *Tractatus de Inventione Dialectica*, in which he devotes considerable space to the discussion of the ability of deaf mutes to acquire such knowledge of language as to be able to converse with others by writing. He was among the first to introduce the study of Greek into Germany, and gave lectures on Greek literature at Worms and Heidelberg.

AGRICULTURAL CHEMISTRY, the study of the chemical relations of substances concerned in agricultural production. The whole natural science of vegetable and animal production is usually called agricultural chemistry, although it includes much of physics, meteorology, vegetable and animal physiology, and geology. It is impossible to separate these subjects, without grave errors; and hence those works which give the justest view of the chemistry of agriculture are not strictly treatises on agricultural chemistry. The object of agriculture is to develop from the soil as large a quantity as possible of useful vegetable products; or indirectly, of animal products. To assist in this, agricultural chemistry must inquire into the composition of the plant and animal. It finds that all vegetable and animal substances contain a variable, usually large proportion of water, which is essential to their life, but may be separated from them by heat without otherwise affecting their chemical composition. At a high temperature, dry animal or vegetable tissues are resolved into two portions; one passes into the air as volatile gases or vapors; another, indestructible by heat, remains as ashes. In most vegetable and animal substances, the combustible or organic part forms 90 to 99 per cent. of the whole dry matter; the proportion of inorganic substances (ash) being small. The organic matter mainly consists of four elements, viz.: carbon, oxygen, hydrogen, and nitrogen. These simple bodies are united in the plant and animal into thousands of combinations, the extended study of which belongs to organic chemistry. Most agricultural products, however, consist chiefly of but a few of these combinations or proximate elements. These may be specified under four classes: 1. The oils and resins, including wax. 2. Cellulose (cell tissue, woody fibre); starch; the sugars, cane and grape; the gums, arabine, bassorine, dextrine (starch gums). 3. Pectose (the pulp of green fruits) and its derivatives. 4. The nitrogenous or sanguigenous[*] principles, viz.: albumen, caseine (legumine, avenine), emulsine, and fibrine (gluten). The first three groups are composed exclusively of carbon, hydrogen, and oxygen (some of the oils, of carbon and hydrogen only), while all the members of the fourth group contain 15 to 18 per cent. of nitrogen, most of them small quantities of sulphur, and phosphorus also, in addition to the three elements above named. The whole growing part of the plant is a porous substance, as easily penetrable by air as a sieve, and a hygroscopic substance, absorbing and retaining the vapor of water from the air or soil with great force and obstinacy. When a vegetable is destroyed by burning, it is mostly resolved into air. On the other hand, when it is formed by growth, its substance is mostly derived from air. The atmosphere which perpetually bathes and penetrates the leaves of plants supplies them with carbon, hydrogen, nitrogen, and oxygen. The atmospheric source of carbon is carbonic acid. This gas is a constant ingredient of the atmosphere to the extent of $\frac{1}{2500}$ of the volume of the latter. It is rapidly absorbed by the leaves of growing plants under the influence of sunlight, and undergoes decomposition in the vegetable cells, carbon being retained and assimilated, while the oxygen is set free wholly or in part, and exhales from the leaves. Water, which always exists in the atmosphere in the state of vapor, is an abundant source of both oxygen and hydrogen. Ammonia, a compound of hydrogen and nitrogen, is the chief source of nitrogen to the plant. It is ever present in the atmosphere in the form of carbonate, though in exceedingly small quantity. Nitric acid, which is formed by the oxidation of ammonia, is also a source of nitrogen. The plant being fixed and at rest, its food must necessarily be in perpetual motion around the organs destined to take it up. The atmospheric food is kept in motion, not only by the winds, but more effectually by the osmotic force (exosmose and endosmose). When two or more gases of unequal density are brought in contact in a confined space, they will gradually diffuse into each other, until they form a homogeneous mixture. If into a mixture of gases any solid or liquid body be introduced, which can combine with and remove one of the gases, it first takes up those particles of this gas which are in its immediate vicinity; but as fast as the uniformity of the mixture is thus disturbed, the absorbable gas diffuses into the space which has become void of it; and as new portions are removed, other new ones are presented, until the whole is absorbed. All the forms of plant food are soluble in water. In virtue of these physical laws, it is plain that the tissues of a growing plant must be constantly surrounded with water, and with carbonic acid and ammonia dissolved in this water; and as these are removed by the assimilating processes of the vegetable, they are restored by osmotic diffusion, so long as the atmospheric supply suffices. —The ash of agricultural plants consists of the phosphates, sulphates, silicates, and carbonates of potash, soda, lime, and magnesia, with small quantities of oxide of iron and manganese, and alkaline chlorides. Other bodies, as alumina, copper, and zinc, are found in some kinds of land plants. The living plant contains sulphur (and perhaps phosphorus) in a state of organic combination, in the various nitrogenous principles, or in sulphurized oils. On burning these compounds, sulphuric and phosphoric acid result. Portions of the potash, soda, lime, and magnesia are combined with vegetable acids (oxalic, tartaric, malic) in the living plants, but these compounds are converted into carbonates by burning. Silica exists probably in the uncombined state in many cases, as in the bamboo (*tabasheer*), stalks of grasses, and scouring rush; but in burning it combines with potash, lime, &c., so that it is found as a silicate in the ash. That these ingredients of the ash are indispensable to the development of vegetation, is proved not only by their invariable occurrence in normally developed plants, but by direct experiment. The cereal grains, for example, will not mature in a soil which is deficient in any one of the following substances, viz.: potash, soda, lime, magnesia, oxide of iron, oxide of manganese, silica, sulphuric acid, phosphoric acid, chlorine. These kinds of plant food are all derived from the soil, and enter the plant through its roots. The medium of their transmission into the vegetable organism is water, which is assisted in its solvent action by carbonic acid and ammonia. The same law of osmotic diffusion, which accumulates the gaseous food of the plant in the tissues of the leaves, keeps up a supply of food from the soil. Evaporation from the surface (foliage and stems) removes from the plant a portion of the water which the cells contain. Capillary action restores this waste of water, bringing up from the soil a fresh supply, which always contains mineral matters in solution. The vague idea of the older vegetable physiologists, according to which there is a constant circulation of sap in plants, an upward and a downward flow—the sap ascending in the outer wood to the leaves, there being elaborated, and returning through the inner bark to the roots, depositing new matter on its way—must be noticed here, as an exploded but still oft-repeated error. There is no evidence that there exists any but an upward and outward current—a current toward the vaporizing surfaces. The amount of ash and the proportion of its ingredients are different in different classes of plants, and in the various parts of the same plant. As a general rule, the exterior or terminal parts of plants, as the bark, leaves, and chaff or fruit envelopes, give the most ash, 7 to 28 per cent.; while the wood of trees is poorest, yielding but $\frac{2}{10}$ to 8 per cent. The same organ contains different quantities of mineral matters at different stages of its growth. Doubtless, part of the substances which we find in the ash of a mature plant have finished their active functions, and have been secreted as waste matters. Doubtless, too, a part of the ash is accidental, not necessary to or employed by the plant, but having entered the vegetable circulation merely from being dissolved in the water which the plant has absorbed. For these reasons there is often little agreement between the numerous analyses which have been executed on the ashes of the same species or even variety of plant, its composition being to a certain extent influenced by the kind of soil in which it grows. Yet there is a general uniformity of composition, and it is undoubtedly true that the organization of the elements, carbon, hydrogen, oxygen, and nitrogen, into the cell tissues, and their contents, requires the coöperation of the ingredients of the ash, and that the relation between them is quantitative and definite, though we may never be able to determine it accurately.—The atmosphere is invariable in composition, and furnishes supplies of oxygen, hydrogen, carbon, and nitrogen (water, carbonic acid, and ammonia), beyond what the natural vegetation of any country needs. The soil is exceedingly variable in composition. When it can supply sufficient quantities of ash ingredients, it will produce most of the plants indigenous to its locality. It then is fertile. When there is a deficiency of ash ingredients in available form, or the absence of any one of them, the soil is barren. There is an important difference between natural, spontaneous growth, and artificial, forced production. Natural growth in general is slow. Cultivated growth is rapid. For the former, natural supplies are sufficient; for the latter, artificial supplies must be provided. For the former the supplies of atmospheric food are in excess compared to those of ash ingredients yielded by the soil (telluric food), so that in forests and prairies the former accumulate on the surface of the soil as dead foliage, which in its decay becomes a telluric source of atmospheric food. In the latter the reverse most usually occurs, so that the organic matter of the soil diminishes and must be renewed by manures. To repeat, in artificial growth (intensive culture) the soil is made to perform not only its natural function of furnishing ash ingredients, but also a part of the office naturally left to the atmosphere, viz.: the supply of carbonic acid and ammonia.—Soils consist of the more or less comminuted fragments of rocks, mixed with certain products of their chemical decomposition, and with some organic matter—*débris* of vegetation. The composition of the soil varies according to the rocks from which it originates. It is rare that large tracts of soil are exclusively derived from the rocks that now underlie them. Most of the soils of our northern and middle states are partly composed of materials transported from the far north during what geologists term the drift period. The soils of valleys are constantly enriched from the rocks of surrounding hills, so that the composition of soils is thus more uniform in a general sense than it otherwise could be. We constantly meet, however, with limited areas having soils of peculiar characters. We find beds of sand, gravel, clay, marl, and peat or muck. The mechanically coarser parts of soil, the gravel and sand, consist of the still undecomposed fragments of the rocks from which it has been formed. A part of the finest (impalpable) portion of every productive soil is usually made up of clay, which is a product of the chemical decomposition of certain minerals, and which possesses properties of the highest moment in agriculture. Under the general name *humus* is comprehended the organic matter of the soil which has resulted from the partial decay of previous generations of plants. The mechanical texture and other physical characters of the soil have a controlling influence on its fertility. Unless the soil be permeable by the roots of plants, and preserve the proper degrees of warmth and moisture, vegetation cannot attain its maximum development, no matter how favorable may be its chemical composition. Assuming then that the soil is physically adapted for a cultivated vegetation, its fertility depends upon its furnishing the growing plant with continuous and abundant supplies of the different bodies that have been named as the elements of vegetable nutrition. The quantity of ash ingredients that the heaviest crop removes from a soil is small, compared with the whole weight of the soil taken to such a depth as is penetrated by the roots of plants. In average crops of the usually cultivated plants, those portions which are removed from the field as the valuable part of the crops do not carry off more than 200 to 600 lbs. of ash ingredients per acre yearly, while the soil taken to the depth of one foot weighs three to four millions of pounds per acre. That part of the soil which is soluble in the water of rain represents its available plant food. Large quantities of water pass through the vegetation of every acre of highly cultivated ground. It is only needful, then, that this water should contain a few thousandths of ash ingredients in solution, in order to supply the mineral matters in an average crop, since even root crops, *e. g.* beets, remove but about 600 lbs. of these substances from the acre. In cultivated soils there is a constant removal of available ash ingredients, both by the harvests that are taken off, and by the rains which soak through or run over them. In a productive soil there is a constant renewal of available plant food, by the mechanical and chemical disintegration of the insoluble portion (the pulverization of the soil by the operations of tillage), by the alternate contractions and expansions of water (frost), and by the affinities of oxygen and carbonic acid. In a few rare soils the disintegrating and solvent processes are so rapid (act on such finely divided or easily decomposable materials), that they always present a surplus of food to the plant. Such are certain soils of southern Russia (*tchernozem* or black earth), and of the Scioto valley, Ohio. They yield successive crops for many years without manure. In most cases, however, the removal of a few crops exhausts the store of available plant food. —Soils, when reduced in fertility, may be restored to productiveness by lying in fallow; mechanical and atmospheric agencies thus bring into solution enough of ash ingredients for a new crop. A soil consisting entirely of coarse sand is infertile, because it is too dry, and because there can occur in it no sufficient accumulations of available plant food. A soil consisting of fine sand may be highly productive, especially if it originates from easily decomposable rocks, because the amount of surface that the grains expose, and the close texture of the soil, maintain it in a proper degree of moisture (by capillarity), and allow a sufficient solution and accumulation of food for crops. Clay has a remarkable porosity and retentiveness for water, for ammonia, and for most soluble salts. If dilute solutions of ammonia, potash, soda, magnesia, &c., be agitated for a few moments with clay, or allowed to filter through it, a portion of these bodies is removed from solution, and absorbed by the clay. Putrid urine loses both odor and color by such treatment. The use of salts of alumina as mordants, and for the preparation of lakes, is another example of the same effect. Soils too rich in clay are heavy, and in wet climates intractable from their physical properties; but in dry countries like Egypt, or when mixed with enough sand to render them physically adapted to the growth of plants, they usually possess a great and durable fertility, since they naturally abound in the aliment of vegetation, and are not liable to suffer loss of their soluble matters from the washing effects of rains or floods. Organic matter (humus), when formed in wet places, constitutes muck and peat, which are not fertile; but as it occurs in arable soils, in quantities usually not exceeding 8 to 10 per cent., it is of great value, not only on account of its power of absorbing water, &c., but also from the fact that in its decay it is a continuous source of carbonic acid and ammonia, thus satisfying to some extent one condition of rapid growth, already insisted upon, viz.: supplies of atmospheric plant food by the soil. The carbonic acid formed in the soil by the slow oxidation of humus acts also, according to the amount of its production, in the chemical disintegration of the insoluble parts of the soil, and thus indirectly furnishes to the plant increased quantities of ash ingredients. Until Liebig turned his attention to the applications of chemistry to agriculture, it was thought by the most eminent philosophers that humus in some of its forms was the chief nutriment of plants. Liebig denied its immediate value as plant food, but recognized its use as an indirect supply of carbonic acid and ammonia. The best soils always contain soluble organic matter, and, although it has not been proved that cultivated plants are directly fed upon it, yet there is evidence that some of the lower orders of vegetation do assimilate it, and there is no reason to suppose that it may not be appropriated by agricultural plants, since it is sufficiently soluble to find its way into their circulation.—*Analysis of Soils for Economical Purposes.* When chemistry first indicated the relation between the composition of the soil and that of the plant, and showed that certain instances of barrenness and fertility in the former could be explained by the results of chemical analysis, the idea that the farmer might profitably employ analysis in improving his soil took deep root. A few considerations will suffice to show, however, that as a general rule even the most accurate analysis can be of no practical benefit. Saying nothing of the facts that the productiveness of a soil often depends on its physical or chemical condition irrespective of composition, that it is in most cases impracticable to get a specimen of soil that shall fairly represent a large field or farm, and that the expense of a thorough and faithful analysis is considerable, it is impossible in the present state of science to distinguish from each other two soils, one of which is just fertile and the other just barren; for the processes that have been usually employed in soil analysis are not nice enough to estimate quantitatively differences of 1-10th per cent. with invariable accuracy. Now, since an acre of soil, taken to the depth of only 7 or 8 inches, weighs at least 2,000,000 lbs., and since the total amount of matter withdrawn from the soil by the heaviest crops rarely exceeds 500 lbs., 1-4000th of the whole, it is folly to expect that analysis can indicate any difference in the composition of a soil before and after one, two, or even three crops have been removed from it. Again, there are numerous instances of soils naturally sterile, which, after application of 400 lbs. of guano, manifested a wonderful productiveness. Now, the largest of the active ingredients of guano never amounts to 20 per cent.; so that to trace its action, or distinguish between two soils, one barren and the other made fertile by guano, the chemist must be able to estimate 100 parts in 2,000,000, or a fraction so small as $\frac{1}{20,000}$. The only method of chemical examination that promises to be useful is the following: A large quantity of soil, say 10 or even 100 lbs., is digested and exhausted with water saturated at ordinary temperatures with carbonic acid. In this way we dissolve all its "presently available plant food." The analysis of this dissolved portion might be expected to give insight into the value of the soil so far as dependent on chemical composition. Dr. Peter, chemist to the Kentucky geological survey, has recorded in his report some results obtained in this way, except that instead of exhausting 10 lbs. of soil, he used but 1,000 grains. The amount of dissolved matters in his trials in no case exceeded 7 grains, while it usually fell below 2 grains, quantities too small for accurate analysis. For practical purposes there are, however, other and in general simpler means of ascertaining the ability of a soil to supply food for remunerative crops. Thus the character and amount of vegetation which it naturally produces generally suffice to indicate with certainty the value of a new soil in this respect. In nearly all cases of unproductive soils, the difficulty is less of a chemical than of a physical nature. The great deserts are sterile, not because they cannot yield the soil food required by vegetation, but because they are destitute of water. Wherever a spring arises in them, there is formed a spot of verdure, notwithstanding the incessant sunshine and parching winds. Some soils, however, with every external sign of fertility, are nevertheless barren, because deficient in some one or several of the indispensable constituents of the ash of plants. To ascertain and remedy these deficiencies, it is best to proceed in a synthetical rather than in the analytical manner, viz.: to make trials, on separate plots of ground, of the effect of adding to the soil those ingredients which are most likely to be wanting. The improvement of the soil involves numerous changes, both in its physical and chemical characters. The correction of the physical qualities of the soil usually effects a marked improvement in its chemical condition. It is at any rate indispensable to the full success of chemical improvements (manures) that the soil be first brought to those degrees of division, porosity, dryness, and depth, that are most favorable to vegetable growth. Besides rendering the soil so dry, warm, deep, and penetrable, that the plant finds a genial rooting place, these operations more or less facilitate the solution and elaboration of the food of the plant, since the soil is thereby divided, and more thoroughly subjected to the action of water and air.—*Theory of Manuring.* When the soil is deficient in those ingredients which favor the growth of the plant, the deficiencies may be supplied by manures. The principles on which manuring depends are the following: 1. Plants require various kinds of solid mineral matters, and derive the same exclusively from the soil. 2. Some plants which in the natural state derive the gaseous elements of their organic structure, viz., carbon, hydrogen, nitrogen, and oxygen, from the atmosphere, must be supplied with more or less of these matters from the soil, in agricultural production. 3. Different plants require different proportions of these substances in order to luxuriant growth. 4. Different plants require different quantities of these substances to mature a full crop. 5. Different plants, from peculiarities of structure, draw differently on the same stores of nutriment. 6. Different soils abound or are deficient, to a greater or less degree, in one or many needful ingredients of the plant. 7. The same soil has a different composition in different years, caused by the removal of matters in the crops, or by the increase of available food from weathering (tillage). The substances usually classed together as manures may have three distinct functions: 1st. They may chiefly serve to improve the physical characters of the soil. Such are some manures that are applied in large quantity, as lime, marl, and organic matters. 2d. They may act partly as solvents or absorbents, and thus indirectly supply the plant with food; *e. g.*, lime, gypsum, salts of ammonia. 3d. Finally, they may enter the plant as direct nutrition. If manures acted merely as direct nutrition, it would be possible to judge of the manuring value of any substance by comparing its composition with that of the ashes of cultivated plants; but since many fertilizers produce all the above-mentioned effects, the question becomes a more complicated one. Notwithstanding the facts which practice has accumulated concerning the action of a great variety of fertilizing substances, and the close scientific study of their effects, we are yet in the infancy of our knowledge respecting them. In agricultural periodicals are reports of thousands of experiments on the value of manures; we find, however, the most conflicting statements, and a chaos of results. There are instances of nearly every proposed fertilizer increasing crops, and as many instances of failure. Farmers, however, continue to experiment as if there were a possibility of proving that for each kind of crop, or each variety of soil, there is a specific and unfailing fertilizer. The principles above stated, taken together with the fact that the physical adaptation of soils to crops is indefinitely varied and constantly changing, demonstrate that there can be no fertilizing panacea. They likewise make evident that what is this year a good application for a certain crop and soil, may have no action next year; and that what is now inefficacious, may prove highly useful at some future time. The most generally useful manures are those which contain the largest number of ingredients, and present them in the greatest variety of forms. Stable manure occupies the first rank among fertilizers, because it contains everything that is needful for the nutrition of plants. It is in fact the *débris* of a previous vegetation, and contains all the ingredients of plants, though in proportions altered from the original ones, and, indeed, advantageously altered. The hay, roots, and grain which mature cattle receive every day as food, are in part digested and assimilated; but since full-grown animals do not increase in weight, unless fattened, they excrete daily as much as they ingest. The most combustible portions of their food are, in consequence of the respiratory process, exhaled as water and carbonic acid gas; while the ash ingredients, and the larger share of the nitrogen, are accumulated in the excreta. In this way there is a concentration of constituents which, after they have served the nutritive function for the animal, become the proper food of the plant. Among the various ingredients of manures, two in particular have acquired a special significance in late years, viz., phosphoric acid and ammonia. These bodies are commercially the most valuable of all fertilizing substances, a necessary result of their scarcity; and in general, phosphoric acid is a smaller ingredient of cultivated soils than any other of the components of the ash of plants. Ammonia, especially in the form of carbonate, not only powerfully stimulates vegetable growth, but it probably exerts a strong solvent effect on the minerals which compose the soil. Hence, guano and other animal manures which contain or yield much ammonia and phosphoric acid, are in such large demand among those who practise "high farming." But the exclusive use of fertilizers which supply to vegetation only a small portion of its ash ingredients, must sooner or later be found inadequate to produce profitable returns; must, in fact, reduce the soil to a minimum of fertility. The true system of manuring is to maintain in excess a supply of all forms of plant food, and indeed of all materials which experience proves to have a good effect on vegetation, whether this effect be chemical or physical.—When chemical analysis first demonstrated that different classes of plants yield an ash of different composition, the idea of special manures had its origin. By special manures were meant mixtures containing just the quantity of each ash ingredient removed from the soil by an average yield of each crop. But investigation has demonstrated that there are in general no practical advantages in these attempts to feed the plant by ration. Lawes and Gilbert, of Rothamstead, England, believed they had established by a multitude of field experiments that ammonia is specially suited to the production of wheat, and phosphoric acid to the growth of turnips; but there are other authentic trials which as fully prove just the reverse. While on a certain soil, and under a certain set of circumstances, experience may without difficulty establish a rule, science is not yet far enough advanced to lay down a universally applicable principle concerning the special nutrition of the various classes of cultivated plants.—*Rotation of Crops.* The greatest return from the soil is generally secured, not by continuously growing one plant, even though it command the highest market price, but by an alternation or rotation of crops. There is no difficulty in cultivating any agricultural plant successively for any number of years on the same ground, provided enough be expended in putting the soil into the right physical and chemical condition. But such a procedure is usually more expensive than alternating the crops. When a light virgin soil comes under the hand of the farmer, it yields good crops for a few years, but then falls to a low state of productiveness. At first it may have yielded wheat; when no longer able to support that crop, it may still give fair crops of barley; the next year, if put to turnips or potatoes, it may seem to recover its fertility somewhat, and produce a good burden of roots; but now it will not yield again a good crop of wheat, though probably clover would flourish on it. The causes of such facts lie partly in the soil, and partly in the plants themselves. As for the soil, as already stated, its composition and texture are perpetually changing. The quantity of organic matter, especially, rapidly diminishes when the soil is under cultivation, and the soluble mineral matters are in most cases removed by cropping faster than they are supplied by weathering or disintegration. Practical men have classed cultivated plants according to their demands on the soil, as follows: Enriching crops, clover, lucern, and esparsette; non-exhausting crops, peas and beans, also cereals when cut green; exhausting crops, cereals, beets, turnips, carrots, and potatoes; very exhausting crops, tobacco, flax, hemp, and hops. Among the causes of the different exhaustive effect of various plants are the following: 1. Different extent or structure of roots and leaves. The enriching crops expose to the air an enormous surface of foliage, and throw out very large, long, and numerous roots. The cereals have much less leaf and root surface. 2. Different rapidity of growth. Clover and root crops continue in foliage during the whole season, while the cereals ripen in July or August. 3. Periods or crises of growth; seed production. Plants which ripen seed require a better soil than those which only produce foliage, because the rapidity of assimilation seems to increase when the reproductive function comes into activity. Plants which ripen seed may require a richer soil, not because they remove more from it, but because they need more in a given time. 4. Some crops are entirely removed from the soil, as flax; while others leave the ground filled with an enormous mass of roots, as clover, or strewn with stalks and foliage, as the potato and beet. 5. The quantity of ash ingredients removed from the soil by different plants is widely unlike. In the light of the above statements, it is easy to see that when a soil refuses to yield remunerative crops of shallow-rooted and quick-growing wheat, it may still produce a luxuriant growth of deep-rooted, large-leaved, and slow-growing clover. It is evident, too, that when a clover ley is broken up and sown to wheat, this grain may yield well, because the decaying turf and roots are a ready source of every kind of plant food. This preparation of the soil for an exhausting crop, by the intervention of one of easy growth, is shown in the practice of green manuring, which is in fact a rotation of crops, but is also a fertilizing process, because the first crop is entirely sacrificed for the sake of the succeeding ones. Green manuring consists in ploughing under clover, buckwheat, spurry, or other crops, when in blossom, so that the soil shall be enriched by their decay. As these plants (the last named especially) will grow on poor soils, it is possible by their help to reclaim the lightest sands, and bring them up to a fair degree of productiveness in the course of a few years.—*Composition of Crops, and their Value as Food.* There are definite and unalterable relations between the character and habits of the animal and the composition and physical qualities of its food. In rearing and sustaining domestic animals, four distinct conditions occur, viz.: growth, or general development; fattening, or increase of flesh and fat; yielding milk; and performing labor. Different species of animals possess different degrees of aptitude in turning their food into one or other of these directions. Thus, the hog fattens most readily, the cow yields most milk, and the horse performs the greatest amount of labor. All these animals might be fed alike on a certain diet, and yet manifest their characteristic tendencies in a good degree, for the functions of all animals are the same to a certain point. That food, however, which best develops fat in the hog, is not best adapted to sustain the labor of the horse. Where the animal's functions are required to differ in their essential nature, there the food must also differ; and we cannot carry the peculiar aptitude of an animal to the highest pitch without particular attention to the quality of the food. In fact, by a careful selection of the food we can change the character of the animal; and when at the same time other physiological circumstances, climate, &c., are suitably regulated, it is possible in the course of a few generations to impress new characters on a race. In this way the various breeds of cattle, swine, &c., have originated. A thorough understanding of the reciprocal relations between food and functional development is therefore of the highest consequence to the practical agriculturist. It cannot be pretended that science in its present state furnishes very extensive or satisfactory knowledge on these points. But physiological chemistry has developed some truths which warrant the hope of progress in this direction. The study of changes in the animal body has shown that there are two chief processes concerned in the maintenance of life, viz., nutrition and respiration. We use the word nutrition in a somewhat qualified sense, understanding by it the support of the working parts of the animal—the muscular, nervous, and cartilaginous tissues. These tissues contain nitrogen as an invariable ingredient, and for their development nitrogenous food, or food containing albumen, caseine, and fibrine, is indispensable. No work can be done on food consisting exclusively of starch, sugar, and oil, because these bodies cannot supply the nitrogen which is required for the organization of the working tissues. In the normal growth of active animals, the non-nitrogenous principles of the food are consumed in the respiratory process. These bodies are brought into contact with the oxygen inhaled by the lungs, and are burned into carbonic acid and water, which pass off in the expired breath. The heat of the animal is sustained by this combustion. In sluggish animals which ingest large quantities of non-nitrogenous food, the excess accumulates in their bodies in the form of fat. Great activity and full respiration are incompatible with this accumulation. The application of these facts is obvious. To keep a horse or an ox in working condition, we give a food rich in nitrogen, as oats; to fatten an animal, we use a food richer in starch, sugar, and oil. Experiments have been made with a view to determine what should be the relation between the nitrogenous and non-nitrogenous elements of the food for working, fattening, and milk-giving animals, as well as for otherwise determining the statics of nutrition. In Saxony much attention has been devoted to these subjects, and experiments in feeding, conducted in that country, have shown that breeding and dairy cattle thrive best when each animal receives daily for every 100 lbs. of its live weight 2·5 to 2·8 lbs. of food (calculated in the dry state), which contains 0·25 to 0·30 lb. of nitrogenous or nutritive, and 1·25 to 1·40 lb. of non-nitrogenous or respiratory, fat-forming material. The stomachs of cattle are adapted for a food containing a large quantity of woody fibre, which is mostly indigestible, and seems to perform a merely mechanical function in exciting the digestive apparatus. In the trials just alluded to, the best proportion of woody fibre was found to be one fifth of the whole dry matter. Years ago attempts were made to construct from chemical analyses tables of nutritive equivalents, for exhibiting the comparative value of different sorts of food. The first essays of this kind were very crude. Later results more nearly accord with experience, being founded on more complete analyses, and with a better knowledge of the wants of the animal; but there are many circumstances whose effect on the nourishing capacity of the different kinds of food has not yet been thoroughly studied. It has been proved that the use of nitrogenous manures increases the relative as well as absolute quantity of blood-forming substances in the grain. The digestibility and consequent nutritive effect of the grasses is greatest when they are cut just after attaining full flower, or, at any rate, before the seeds have hardened, as at this period they contain the maximum of soluble matters. Afterward the quantity of woody fibre increases. The cereals yield more and better flour when cut while the berry is still in the milk, and for a similar reason. The use of cooked food for cattle depends upon the fact that the cooking of food by boiling or steaming is equivalent to the preliminary processes of digestion; as in both cases cellulose, starch, dextrine, and the gums are progressively converted into grape sugar.—Toward the end of the last century the vague and ancient notions that air, water, oil, and salt formed the nutrition of plants, began to be modified with some truer ideas. In 1761 Wallerius, a Swede, in his treatise *Fundamenta Agriculturæ Chemica*, recognized to some extent the connection between the composition of the ash of plants and that of the soil. Bergman, the great Swedish chemist, Palissy, and Réaumur also sought to study the chemical conditions of vegetable growth. In 1802 Sir Humphry Davy was invited to lecture before the English board of agriculture, and thereafter made numerous important observations. He recognized the fertilizing effects of ammonia, and analyzed numerous manures, including guano. About the same time Sennebier and De Saussure laid the foundations of vegetable physiology, demonstrated the assimilation of carbonic acid and water from the air, and indicated atmospheric ammonia as the probable source of nitrogen to the plant. De Saussure also fully recognized the nature, importance, and source of the ingredients of the ash, and studied the life of the plant in all its phases. In 1832 Sprengel made numerous analyses of the ash of plants and of soils, employing more perfect methods than had been previously known. It was reserved for the splendid genius of Liebig to unite the fragments of truth into an organic whole. The force of his rhetoric, not less than of his logic, excited intense interest in the chemistry of agriculture; and being the most popular teacher that this science has ever employed, he has contributed vastly to the enlistment of laborers in this important field. While Liebig discussed only "the applications of chemistry to agriculture and physiology," his celebrated work under that title having been written at the request of the British association for the advancement of science, Boussingault, a Frenchman of genius and wealth, occupied himself with the special study of the practical operations of agriculture, and in 1842 issued his *Économie rurale*, a mine of valuable observations and experimental results. From that time on, the number of those devoted to the study of agriculture has rapidly increased.

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[*] *Blood-producing;* so called from the function of these bodies in animal nutrition.

AGRICULTURE, the art of cultivating the ground, and of obtaining from it the products necessary for the support of animal life. The change from a state of nature, in which the human race must have first lived, to the pastoral, or to any higher mode of living, must have been gradual, the work perhaps of ages. The race was doomed to toil, and necessity soon sharpened the power of invention. In the course of time, during which man multiplied and wandered about from place to place, the countries watered by the Euphrates, the Tigris, and the Nile were found to be most productive, and the dwellers in their valleys engaged in tilling the soil; while the dwellers in the hilly countries of Syria and the lands east of the Mediterranean, which were better adapted to grazing, became the owners of flocks and cattle. The chief riches of the early Jewish patriarchs consisted of cattle and fruits. Chaldea and Egypt, from the remotest recorded times, were noted as the lands of corn. The fertility of the valley of the Nile, a strip of country from 7 to 8 miles in width, gradually sloping down to the river, and extending from 400 to 500 miles, is well known. It was overflowed from about the beginning of August to the end of October, and the subsiding waters left the richest possible top-dressing of slime and mud. Then the cultivator had only to cast the seed, turn on a herd of swine to tread it in, and await the harvest. The agriculture of a people must be influenced by the climate and natural features of the country. Its progress must also depend in a great degree on the density of the population. The processes employed must have been extremely simple at first, being confined without doubt to merely preparing the ground for seed, without any attempt to stimulate its productiveness. So far as we know, Egypt, Chaldea, and China were among the first nations which extended the limits of agricultural practice in ancient times. In these countries, probably, animal power was first applied to agriculture; and among the hieroglyphics on the ancient tombs of Egypt is found the representation of an implement resembling a pick, which was used as a plough. From Egypt a knowledge of agriculture extended to Greece, and we find it in a tolerably flourishing state 1,000 years before Christ, if we may believe the testimony of Hesiod, who describes a plough consisting of a beam, a share, and handles. We may infer that the early settlers of Sparta possessed a knowledge of draining, since the site of the city was surrounded by swamps and marshes, and must have been well drained before it could be made even habitable. In Greece the art of farming gradually advanced, until in the days of her glory it may be said to have attained in some provinces a high degree of perfection. The Greeks had fine breeds of cattle, horses, sheep, and swine; many of the implements of husbandry in use among them were not very unlike in principle those of modern construction; and extensive importations were made from foreign countries of sheep, swine, and poultry, for the purpose of improving the stock. The use and value of manures were known also. The Greek farmers composted with skill, and saved the materials for the compost with care. The importance of a thorough tillage was well understood by them; they ploughed three times with mules and oxen, and sometimes subsoiled, and often mixed different soils, as sand and clay; they cultivated the apple, pear, cherry, plum, quince, peach, nectarine, and other varieties, together with figs, lemons, and many other fruits suited to the climate. The names of several of their agricultural writers have come down to us, though the works of only a few of them are extant, and of these the treatise of Xenophon is the most valuable. But, in comparison with many other countries, Greece was not well fitted for tillage. Agriculture was not a source of pride with the Greeks, as it afterward became with the Romans. One cause of this was the fact that the land was tilled mainly by a subdued and menial race, the dominant race cultivating other arts, and caring more for building up their cities than for cultivating the soil. On the contrary, a high appreciation of agriculture seems to have been a fundamental idea among the early Romans. A tract of land was allotted to every citizen by the state itself, and each one was carefully restricted to the quantity granted. It was said by the orator Curius, that "he was not to be counted a good citizen, but rather a dangerous man to the state, who could not content himself with seven acres of land." The Roman acre being about one third less than ours, the law actually limited the possession to about five acres. This, however, was only in the early days of Rome, and afterward, as the nation became more powerful, and extended its limits by conquest, the citizen was allowed to hold 50 acres, and still later he could be the holder of 500. The limitation of the freehold in the earlier history of the nation, in connection with the old Roman love of agriculture, led to a careful and exact mode of culture, probably with the spade, and hence large and abundant crops were obtained. No greater praise could be bestowed upon an ancient Roman than to give him the name of a good husbandman. Cincinnatus was called from the plough to fight the battles of his country, and Cato the censor, distinguished as an orator, a general, and a statesman, is most loudly commended for having written a book on farming. The Roman senate ordered the 28 books of Mago, the most voluminous writer on agriculture in Carthage, to be translated into Latin for the use of the Roman people. Rome had in later times, including a century previous to the Christian era, an agricultural literature unsurpassed by that of any other country, ancient or modern, with the exception perhaps of Germany, France, and England of the present day. The works of her best writers, or such of them at least as have been transmitted to us, abound in sound maxims. "Our ancestors," says Cato, "regarded it as a grand point of husbandry not to have too much land in one farm, for they considered that more profit came by holding little and tilling it well." And Virgil says: "The farmer may praise large estates, but let him cultivate a small one." Speaking of the planting of trees as a means of protecting fields from high winds and storms, Pliny says: "Men should plant while young, and not build till their fields are planted; and even then they should take time to consider, and not be in too great haste. It is best, as the proverb says, to profit by the folly of others." The Roman farmers also paid much attention to the breeding of stock. Columella mentions the points of a good milch cow to be "a tall make, long, with very large belly, very broad head, eyes black and open, horns graceful, smooth, and black, ears hairy, jaws straight, dewlap and tail very large, hoofs and legs moderate." The same writer prescribes a curious treatment of working oxen, as follows: "After oxen get through ploughing, and come home heated and tired, they must have a little wine poured down their throats, and, after being fed a little, be led out to drink; and if they will not drink, the boy must whistle to make them." The Roman agriculturists whose works have come down to us are Cato, Varro, Virgil, Columella, Pliny, and Palladius. But there were obstacles in the nature and constitution of Roman society which made it impossible for the agriculture of Rome to reach a very high development. In the earlier days of the state, as we have seen, it was honored, but then the nation was in its infancy, extremely rude, and with a small population and a small territory. It was a time, too, when commerce was looked upon as degrading, and war and agriculture engaged the whole attention of the Roman citizen, the farmer thinking himself able both to till and to defend his little farm. As the empire grew in power and wealth, the operations of agriculture were intrusted mainly to the hands of bondmen, who had little or no interest in the soil they tilled, and this alone was sufficient to prevent the art from reaching its most perfect condition. This imperfect cultivation was, without doubt, characteristic of the agriculture of Italy to some extent during the whole history of the Roman empire. We have, however, the statements of many successful crops, which show the interest manifested by individuals in different places. Thus Pliny says that 400 stalks of wheat, all grown from one seed, were sent to the emperor Augustus; and at another time 340 from one seed were sent to the emperor Nero from Byzacium in Africa, accompanied by the statement that "the soil when dry was so stiff that the strongest oxen could not plough it, but after a rain I have seen it opened by a share drawn by a wretched ass on the one side and an old woman on the other." As time passed on, improvements were made in the plough and other agricultural implements. The Roman plough, the exact model of which is still used in Italy, the south of France, and part of Spain, consisted of a beam to which the yoke was attached, a handle or cross piece by which the ploughman held a share fixed into a share beam, two mould boards or one at pleasure, a coulter, and sometimes a wheel, which could be used or not at will. There were ploughs for heavy soils and ploughs for light ones, and indeed nearly every variety, so far as the principles of construction were concerned, which is known at the present day. The Romans also used spades, hoes, harrows, rakes, and some other farm implements. With all these, however, the farmer's work advanced but slowly. The first ploughing required two days for a *jugerum* (⅝ of an acre), and the second one day. The difference of soils and their adaptation to particular crops were well understood. Manures were saved with care. The excrements of birds were especially valued, and judiciously applied; composts were made in suitable places, hollows being scraped out in the form of a bowl to receive the wash from the house, and properly protected from the heat of the sun; lupines and clover were sown to plough in green, and the grain stubbles were often burnt over for the sake of the ashes. With these appliances they raised wheat, rye, barley, oats, flax, millet, pease, beans, turnips, the grape, and the olive. But perhaps the ancients suffered more inconvenience in their agricultural operations from their failure to apply the mechanical forces of nature as a substitute for hard labor, than from any other cause. Even the water wheel was not known till more than 100 years after Christ, and the wind swept over the hills of Europe till the 11th century without turning a single mill. With the exception of some casual allusions by Roman writers, we have no accounts of the agriculture of other nations at or before the time when the Roman empire had begun to decline. But there is every reason to suppose that the art had reached a greater degree of perfection in countries east of the Mediterranean and in Egypt, than in Italy. It is certain that the inhabitants of the East were familiar with many mechanical appliances unknown to the Romans, and probably their agricultural systems were more complete. Rome herself, in the later days of her greatness, was supplied to a certain extent with the agricultural products of her conquered provinces. Then set in that vast tide of conquest from the north, pouring over Italy, France, and Spain a race of barbarians, who gradually became absolute masters of nearly every country into which they penetrated. Agriculture was extremely depressed, and the condition of the serf to whom the tillage of the soil was left was in some cases even more hopeless and pitiable than that of the Roman slave who had tilled the soil before him. Scarcely a gleam of sunshine in the shape of improved culture lights up the gloom of this period, with the important exception of the introduction of an extensive system of irrigation in Spain, under the Saracens. These eastern invaders from the well-watered lands of western Asia and Egypt established in the peninsula what has been termed the southern system of agriculture, in distinction from the more peculiarly northern system of drainage, and developed the agricultural resources of Spain to an extent wholly unparalleled at that time in Europe, building reservoirs, canals, and aqueducts with immense labor and skill, and raising the annual revenues of that part of Spain under their dominion to nearly $30,000,000—"a sum," as Gibbon says, "which in the 10th century probably surpassed the united revenues of all the Christian monarchs." The traces of these gigantic works still remain. Bruges and Ghent were important manufacturing and commercial towns as early as the 11th century, and agriculture and manufactures there grew up together, even before a large part of Europe had risen from a state of barbarism; but the agriculture of Belgium and Holland was long in attaining the perfection to which it has now arrived. In Britain, the Romans had made many alterations for the better during their 400 years of occupation, as they were accustomed to do in all their provinces; but the agriculture of the island was extremely rude even when they left it, by far the greater part being covered with forests and marshes. Then the Saxons overran the country, subsisting mainly by the chase and by keeping large numbers of cattle, sheep, and especially swine, which readily fattened on the mast of the oak and the beech. In general, the only grains raised were wheat, barley, and oats, and they had but small quantities of these. The results of their labor were so uncertain and insecure, on account of the inability of the government to protect property and life, that all attempts at improved agriculture would have been in vain, even if individuals had been disposed to engage in them. The suffering among the people was often intense, famines frequently occurred, and so little was done to furnish suitable winter food and shelter for the stock, that a large part of the cattle perished every winter, especially in the more northerly parts of the island. The proportion thus dying annually has been estimated at one fifth of the whole number in the country, while frequently the most terrible murrain swept off a far larger proportion. No hoed crops or edible vegetables were cultivated, and even as late as the reign of Henry VIII. Queen Catharine was obliged to send to Flanders or Holland for salad to supply her table. Neither Indian corn, nor potatoes, nor squashes, nor carrots, nor cabbages, nor turnips were known in England till after the beginning of the 16th century. The peasants subsisted chiefly upon bread made of barley, ground in the quern or hand mill, and baked by themselves. The tenant peasantry had no security for their property till after the middle of the 15th century. If the estate was sold by the landlord, they were obliged to quit all, giving up even their standing crops without compensation. They were liable for the debts of the landlord to an amount equal to their whole property, and it was not till after that time that they were held only for the amount of rent due from them. This picture of the misery and suffering which prevailed in Britain will give a fair idea of the state of things in Europe generally at the same time. Rather more attention, however, was paid to the culture of the soil in the religious establishments, whose tenancy was more secure. Under the direction of the monks extensive improvements were made in draining swamps and reclaiming extensive tracts from the sea. The feudal system, introduced into England soon after the Norman conquest in the latter part of the 11th century, checked progress in agricultural improvement. The crusades elevated the condition of the peasant in some degree, by increasing the value and importance of his labor, by making the acquisition of land somewhat easier, and by withdrawing from the country many ignorant and despotic nobles, some of whom returned with a profitable recollection of the far higher culture and fertility of the East. But the agriculture of this whole period was generally as low as was possible in an age making any pretension to civilization.—We may fix upon the 16th century as the time when Europe awoke from its long slumber. From that time to the present, the gradual elevation of the middle and lower classes has continued, and agriculture has steadily advanced. The first work on agriculture published in England was the "Boke of Husbandrie," in 1523, by Sir Anthony Fitzherbert, who styles himself "a farmer of 40 years' standing." This was followed by another volume by the same author on land surveying. In these works Fitzherbert points out the prevailing practices of his time, condemning some and approving others. "A housebande cannot thryve," says he, "by his corne without cattell, nor by his cattell without corne;" and he adds, "Shepe, in myne opinion, is the most profitablest cattell that any man can have." From him it appears that marl was in common use in his day, as it had been in the island even when it was invaded by the Romans before the Christian era. Thomas Tusser's "Five Hundred Points of Good Husbandry," in a sort of doggerel verse, followed a quarter of a century later, and went through many editions. The editor of one published in 1812 says that he found difficulty in procuring a complete copy, "a proof that what was intended for practical use had been sedulously applied to that purpose. The copies were passed from father to son, till they crumbled away in the bare shifting of the pages, and the mouldering relic only lost its value by the casual mutilation of time." Tusser mentions carrots, cabbages, and turnips, as having just been introduced as kitchen vegetables. Then appeared "The Whole Art of Husbandry," by Barnaby Googe; "The Jewel House of Art and Nature," by Sir Hugh Platt, from whom we first hear of the introduction of white clover into cultivation in England; and in 1649 appeared the "English Improver" of Walter Blithe (afterward revised and called the "Improver Improved"), a work full of judicious maxims and sound advice, giving us an insight into the prevailing practices of that time. Sir Richard Weston wrote about the same time on the husbandry of Brabant and Flanders, under the name of Samuel Hartlib, who himself made important contributions to agricultural literature. But the experiments and writings of Jethro Tull, in the early part of the 18th century, are among the first important attempts at real progress in the agriculture of modern times. Writers before his time had confined themselves mainly to plain statements of the practical details of farming, recommending such new practices as appeared to them worthy of adoption, and condemning the errors of their contemporaries. Tull struck out new paths of practice, invented new modes of culture, and his investigations into the principles of fertility fairly entitle him to the credit of being a great original discoverer, though the errors into which he fell in his zealous enthusiasm brought more or less temporary discredit upon his whole theory. But we can excuse his mistakes when we consider that he, like all his predecessors, was groping in the dark, before chemistry and geology had made known the elements of the soil and of plants, and shown how the latter derive their support and nourishment. Tull invented and introduced the horse hoe and drill husbandry. The latter had, indeed, been known previously in Spain, and according to some in Germany also, but it was not known to any extent in England. He also invented the threshing machine, though the flail was almost universally used in England till the close of the last century. His doctrine that plants derive their nourishment from minute particles of soil, and that repeated and thorough pulverization is therefore necessary not only as a preliminary preparation, but during the growth of the plant, led directly to the practice of drilling grain crops, and the awkwardness and prejudice of his workmen led to the introduction of the drilling machine and the horse hoe as substitutes for hand labor. So far Tull was right in practice, however incorrect his theory may have been. The best practical farmers of the present day believe in frequent, deep, and thorough pulverization of the soil, not because the plant is supposed to live on minute particles of earth, but to admit air and moisture freely to the roots. Tull's theory of the nutrition of plants has not been without its followers, however, Duhamel himself having labored to spread it. Tull believed to some extent in the use of manures, but chiefly as dividers of the soil, as a means of improving its physical texture, and not because he supposed them to furnish any nutriment to the plants themselves. His system of husbandry found very few followers at first, and those who adopted it were in many cases obliged to return to the old methods, for want of the necessary mechanical instruments for following his directions; but it has been more recently revived, mechanical skill making it practicable and comparatively easy of application, while thorough drainage, trenching, and subsoil ploughing have gained the assent of most intelligent farmers. Even his drilling system for wheat and other grain crops has been extensively adopted in Great Britain, and is fast gaining favor. After Tull, we find little progress in agricultural literature till toward the close of the last century. The chief gain in the art in the intermediate time was occasioned by an active competition in cattle breeding by Bakewell and others in England, which led to the most important practical results. Arthur Young, to whom perhaps the world is more indebted for the spread of agricultural knowledge than to any other man, was born in 1741, and died in 1820. His journeys to obtain information on agricultural subjects, and his writings, had a powerful influence in creating a love for agricultural pursuits among the learned. His searching inquiries and experiments on different soils, to ascertain the real causes of fertility (1783–'6), laid the foundation at least for more exact researches into the principles of fertility afterward. He first established the fact that common salt is a valuable manure, though it had been recommended before his day. Previous to his time ammonia was thought to be injurious to vegetation, and natural philosophers had asserted that the food of plants was contained in acids. Young tried it in very many cases, and always with great success. He made experiments to learn the effect of the sun's rays on the soil, and came to the conclusion "that covering the soil is beneficial to it."

Hence we may infer the error of the ancient practice of summer fallowing, which left the ground wholly unoccupied with crops every second or third year; a practice which continued in England down to a comparatively recent period, and even now prevails in many parts of Europe. He found that nitrogenous manures increased the power of plants to avail themselves of mineral manures, thus showing the advantage of a proper use of both classes, a conclusion whose truth has been still more recently established by Lawes and others. He also tried the effect of different gases on vegetation. In 1786 he says: "To imagine that we are ever to see agriculture rest on a scientific basis, regulated by just and accurately drawn principles, without the chemical qualities of soils and manures being well understood, is a childish and ignorant supposition." Such were some of the efforts of Arthur Young; they may be found embodied in the "Annals of Agriculture," and other useful treatises. But one of the first systematic works on the subject, which can be said to have really advanced the art of agriculture, was the "Practical Agriculture, or Complete System of Modern Husbandry," by R. W. Dickson (1805), which Thaer, who had it translated and published in Berlin in 1807, calls the first truly scientific work of the English, not even excepting Young's writings. Dickson's chief merit, however, is his excellent collection of the many valuable experiments and statements of distinguished members of the board of agriculture, and other farmers. In the period embracing the close of the last century and the beginning of the present, we find many important additions to the literature of agriculture. Such are the works of Marshall; the admirable works of Young already alluded to; Elkington's "Mode of Draining Land," described by Johnstone; "Davison's Phytology," "Modern Agriculture," and "Synopsis of Husbandry," by Donaldson; the "Gentleman Farmer," by Lord Kames; "Anderson's Essays"; the "Communications to the Board of Agriculture," and numerous agricultural reports. "The Experienced Farmer" and many others might be mentioned, all of which contributed more or less to awaken the spirit of inquiry and improvement which has eminently characterized English agriculture for the last 50 years, and made it a model for the rest of the world. Nor has the agriculture of Scotland felt the influence of the spirit of progress in a less degree. In 1768 Lord Kames, in the "Gentleman Farmer," very forcibly described its imperfect condition at that time. He says: "Our draught horses are miserable creatures, without strength or mettle; our oxen scarcely able to support their own weight, and two going in a plough, led on by two horses; the ridges in the fields high and broad, in fact, enormous masses of accumulated earth, that could not admit of cross ploughing or cultivation; shallow ploughing universal; ribbing, by which half the land was left untilled, a general practice over the greater part of Scotland; a continual struggle between corn and weeds for superiority; the roller almost unknown; no harrowing before sowing, and the seed sown into rough, uneven ground, where the half of it was buried; no branch of husbandry less understood than manure; potatoes generally planted in lazy beds; swine but little attended to; and very few farms in Scotland proportioned to the skill and ability of the tenant!" "What a contrast," exclaims Sir John Sinclair, 40 years after, "to the present state of Scotch husbandry; and it is singular that, with hardly an exception, these imperfections have been removed. Had it not come from so high an authority, it is hardly possible to credit, that within the memory of so many persons now living our agriculture could have been so miserably deficient as it seems to have been at that time." But in the course of these 40 years the Scotch farmers had acquired a habit of reading, and agricultural books were extensively distributed among them. Besides this, many of them visited other countries for the purpose of obtaining information, and observed the improved practices prevailing there, to return and introduce them at home. Sir John Sinclair was born in 1754, and died at Edinburgh in 1835. His writings were numerous and important. Hartlib, a century and a half before, and more recently Lord Kames in the "Gentleman Farmer," had pointed out the utility of a board of agriculture, but it was left to the zeal and untiring effort of Sir John Sinclair to call into life that valuable auxiliary to agricultural progress, and the board was created in 1793. To its establishment, more than to any other movement of that day, England is indebted for the present high and prosperous state of her agriculture. It brought men together from all parts of the kingdom, made them acquainted with each other's views, and with the modes of culture prevailing in sections of which they had previously been ignorant. It was through the encouragement of the board of agriculture chiefly that Sir Humphry Davy was led to investigate the elements of the soil, and to apply the science of chemistry to the improvement of agriculture. And here begins properly the real progress of the art; for without a knowledge of the simple substances of nature, agriculture could not be expected to attain the rank of a science. The lectures of Davy before the board of agriculture from 1802 to 1812, therefore, mark an important epoch in the history of modern agriculture. The substance of these lectures was embodied in his "Elements of Agricultural Chemistry," published in 1813, and translated into German in 1814, and into French in 1829. This work opened to the reflecting farmer new and interesting views of the principles of fertility and vegetation. Davy showed how plants, soils, and manures could be analyzed, and manures selected which would furnish the elements needed by the different varieties of plants. We find him in 1807 trying to ascertain the effects of various salts on barley, grass, &c., in light, sandy soils, applying twice a week diluted solutions of sulphate, acetate, bicarbonate, and muriate of potash, sulphate of soda, and nitrate, muriate, sulphate, and carbonate of ammonia; finding, as Young had found, that plants furnished with carbonate of ammonia grew most luxuriantly, a result which had been anticipated from the composition of carbonate of ammonia. Davy experimented on specimens of guano sent to the board of agriculture in 1805, the existence of it in large quantities on the South sea islands having been pointed out by Alexander von Humboldt. In 1806 elaborate analyses of guano were published by Fourcroy and Vauquelin. Davy, writing at this time, says: "The dung of sea birds has never been used in this country." Davy recommended the use of bones as a manure, not so much because they contained phosphate of lime, as because they were filled with decomposable animal matter, as gelatine, cartilage, fat, &c. But though the results obtained by Davy were imperfect, and in some cases erroneous, they made important advances in an almost untrodden path of investigation. The facts established by his researches as to the effect of ammonia on vegetation, may be regarded as the starting point of modern scientific investigations into the properties of this substance when used as a manure; for, though Young first led the way in observing its practical effect on plants, his conclusions, from his want of chemical skill, had not the scientific certainty which characterized Davy's, and which was necessary to give them their highest value. It may indeed be said that he was the means of drawing the attention of chemists to this particular branch of their science; for through the influence of the reputation he gained, the thoughts of other scientific men, and especially of the chemists on the continent, were turned in this direction.—In general, the literature of agriculture had advanced more rapidly on the continent than in England. In Germany especially many writers had treated of the subject, more particularly in works on political economy. In the latter half of the last century many treatises of practical value appeared, such as those of Kretschmar, Reichart, Stisser, and Sprenger. At the same period Duhamel wrote in France, and adopted the views of Tull in regard to the nourishment of plants. In his treatise on the cultivation of the soil he endeavors to determine the principles of agriculture by theories deduced from experiments, which subsequently received a more scientific form in the "Elements of Agriculture," published in Paris in 1771. Duhamel, Buffon, and others, by their superior genius, made the study of rural economy attractive to scientific men in France; and hence there has been there more original research in agricultural chemistry, vegetable physiology, and other kindred branches, than in any other country except Germany. As early as 1780 there were 13 agricultural societies in France, with about 19 auxiliary societies. The survey of France by Arthur Young, in 1787 and 1789, also did much to excite an interest in the improvement of the soil, and to make the peculiarities and wants of the country more familiarly known even to Frenchmen themselves. Merino sheep were brought into France in 1776, and kept under charge of the government for the improvement of the stock of the country. Bonaparte greatly increased the number of societies, established professorships, botanical gardens, &c., all of which concurred to elevate the study of agriculture in the estimation of those capable of bringing to its aid the principles of the abstract sciences; and this tendency has influenced the scientific minds of France to the present day, though the practice of the country has not kept pace with the development of theory. This is owing partly to the division of property since the revolution, the holdings, as a general thing, being very small.—The earliest settlers of the United States found the country a wilderness, with many varieties of climate and soil to which the knowledge they had obtained in the mother country did not apply. Thus they had to contend with innumerable obstacles, with the wildness of nature, and their ignorance of the climate, in addition to the hostility of the Indians, the depredations of wild beasts, the difficulty and expense of procuring seeds and farming implements, &c. These various difficulties are quite sufficient to explain the slow progress they made in the way of improvement. For many years agriculture was exceedingly backward. Stock and tools were poor, and there were obstacles and prejudices against any "innovations" in the established routine of practice. This state of things continued for many years, with very little change. Jared Eliot, a clergyman of Connecticut, one of the earliest agricultural writers of America, published the first of a series of valuable essays on field husbandry in 1747; but, with this and a few other exceptions, no real efforts were made to improve farming till after the revolution, when the more settled state of the country and the gradual increase of population began to impress the intrinsic importance of the subject upon the minds of a few enlightened men. The South Carolina agricultural society was established in 1784, and still exists; and the Philadelphia society for the improvement of agriculture, established in the same year, and a similar association in New York in 1791, incorporated in 1798, and the Massachusetts society for the promotion of agriculture established in 1792, were active in their field of labor, and all accomplished important results. The correspondence at this period between Sir John Sinclair and Washington shows how anxious was the father of his country to promote the highest interests of the people by the improvement of agriculture. Many years elapsed before the habit of reading became sufficiently common among the masses of the actual tillers of the soil to justify an expectation of immediate profit from the annual publication of the transactions of the several societies. The improvements proposed fell dead upon the people, who rejected "book farming" as impertinent and useless, and knew as little of the chemistry of agriculture as of the problems of astronomy. All farm practices were merely traditional; no county or town agricultural societies existed to stimulate effort by competition. There were no journals devoted to the spread of agricultural knowledge. The stock of the farm was such as one might expect to find under such circumstances; the sheep were small and ill cared for in the winter, and the size of cattle generally was but little more than half the average of the present time. The value of manures was little regarded; the rotation of crops was scarcely thought of; the introduction even of new and labor-saving machinery was sternly resisted and ridiculed by the American farmers of that day, as well as by the English laborers. It was long before the horse rake was brought into use in opposition to the prejudices it encountered. It was equally long before the horse-power threshing machine was adopted. In some parishes of Great Britain, even so late as 1830, the laborers went about destroying every machine they could find. Within the last half century, chemistry, the indispensable handmaid of agriculture, has grown with great rapidity, and in each new discovery some new truth applicable to practical agriculture has come to light.—In the time of the Saxons, in England, as we have already seen, the plough was extremely rude. It was made by the ploughman himself, under the compulsion of a law forbidding any one to hold a plough who could not make one, or to drive until he could make the harness. The progress made previous to the time of Jethro Tull was comparatively slight, either in the manufacture of the plough, or in any other branch of agricultural mechanics. Tull, as we have seen, invented the horse hoe and the drilling machine. Both of these were then rude, but they have since been vastly improved in their details. The plough was generally made of wood till the beginning of the present century, but its form has since passed through many changes. It cannot yet be regarded as a perfect implement of its kind, but it has been fast approaching toward perfection of late years, and the mode of manufacture has improved to an equal extent. (See PLOUGH.) Nor has the improvement in other farm implements been less marked than in the plough. Spades and hoes are lighter and better constructed than formerly. The reaper and the mower have gained a firm footing even within the last 30 years. As labor and time-saving machines are now deemed indispensable by all who raise grain and hay on a large scale, the reaper and the mower may be regarded as types of the present, as the sickle and the flail are types of the past. (See MOWING AND REAPING MACHINES.) Among the other labor-saving implements which are now generally introduced upon farms of any extent are the horse rake, the improved horse hoes, the seed and corn sowers, the broadcast seed sower, the improved subsoil and trenching ploughs, the straw and root cutters, the cultivators, the threshing and winnowing machines, and many others of equal importance. It is safe to say that the improvements in the implements named, made within the last half century, have enabled the farmers of the United States to accomplish at least double the amount of labor with the same number of teams and men. This is a grand and practical advance over all former periods in its history, and promises a future development of the resources of agriculture almost beyond the power of language to describe.—The progress which has been made in the application of chemistry to agriculture is hardly less gratifying. For though from year to year there may seem to be little progress, yet when we compare any two periods of five or ten years, the increase of practical knowledge derived from the investigations of the agricultural chemist, as well as its importance, is very perceptible. Since 1840, chiefly through the labors of Prof. Liebig, animal and mineral phosphates, superphosphate of lime, and other artificial manures have come to be very extensively employed; and it is only since the same date that guano, though known long before, has come into general use. (See AGRICULTURAL CHEMISTRY, BONE DUST, GUANO, &c.) An impartial survey will show that the actual production of the means of supporting life has largely increased, as the true principles of cultivation have become better known and understood. The average yield per acre of some of the cultivated grains, as wheat, for instance, has nearly quadrupled in countries where these principles have gained the strongest hold, even within the memory of men still living; and this increase is not merely proportionate to the greater number of producers, or the additional acres brought under tillage, but an absolute increase per acre. It is difficult to ascertain the amount of crops, or the average yield, of very distant times past, but the average yield per acre of wheat in the 11th century was estimated by the highest authority of that day, the author of "Fleta," at only 6 bushels. So 300 years later, in 1390, 57 acres on a farm at Hawsted yielded only 366 bushels, and on an average of three years little more than that. The actual productive power of Great Britain in the article of wheat alone increased during the half century from 1801 to 1851 to the extent of supporting an additional population of 7,000,000, an increase which can be ascribed with confidence mainly to improved cultivation. So in every country where agriculture receives the attention it deserves, the productive power of the soil has largely increased. Even the Atlantic states of the Union, where the system of cultivating the soil without maintaining its fertility by a proper treatment prevailed for many years, are not an exception, since the condition of agriculture is rapidly improving in the oldest of them, where this system was earliest begun, and the general average of crops, with the exception of the potato, is increasing from year to year as a more proper culture is introduced and persevered in, the farmer being led to improve his practice by the pressure of an increasing population and constantly rising prices. In New England, for instance, one of the oldest sections, the general average yield of Indian corn per acre has risen to about 35 bushels, while crops of 50 and 60 bushels per acre are not uncommon, and 80 and 100 are sometimes obtained by careful tillage. The situation and soil of New England are not such as to make it what is called a wheat-growing region, and this fact, which farmers were long in understanding, has caused a great decrease in the extent of land devoted to this crop. Indian corn, root crops, and all the varieties of fruit suited to temperate latitudes, are found to be more certain and remunerative, and attention is given mainly to them. In the mean time the system of farm management is gradually improving, new implements to facilitate labor are introduced, and much greater care and economy than formerly in regard to manures everywhere prevail, most farmers having good barn cellars arranged for its preservation, into which peat and loam are carried in large quantities, and composted from time to time during the winter as absorbents and divisors. Societies have been established in all the states, and in most of the counties. In Massachusetts a department of agriculture is organized as a branch of the government, to collect, arrange, and systematize all the latest information on the subject for distribution among the people, and to superintend the development of the established policy of the state; and a bureau of agriculture has more recently been established by the national government, in the interior department. In the middle states societies are equally active in efforts to raise the standard of their agriculture, and have adopted a similar liberal policy, and in some, especially New York, a high degree of improvement has been reached. The western states are more strictly and exclusively agricultural than any other section of the country. Most of them publish annually, at the expense of their governments, valuable reports on practical agriculture for circulation among the people. Notwithstanding the immense amount already produced, however, the resources of the west have but just begun to be developed as they are destined to be hereafter. The southern states are also large producers of grain, but are mainly devoted to the raising of cotton and sugar, both of which are exported in large quantities.—The present condition of practical agriculture in Great Britain has already been alluded to, as worthy of imitation in other countries of similar climate and soil. But the points in which progress is most distinctly seen are the extensive culture and use of root crops, the general system of thorough drainage, the introduction and use of new and improved implements of husbandry, and the breeding of stock. The land, unlike that of the United States, where as a general rule the farmer is the owner as well as the cultivator, is held chiefly in large estates, concentrated in the hands of a few individuals, and leased to the tenant farmer, who either tills it himself or sublets it to others. But few, therefore, of the actual tillers of the soil are owners of land. Associated effort has done much to awaken a lively interest in the subject, both among the nobility and the people. The royal agricultural society, established in 1839, with its ably conducted journal, the Highland agricultural society of Scotland, and the royal society of Ireland, are doing all in their power to develop the agricultural resources of the country. Many valuable agricultural journals are well supported and widely circulated. In France the tendency for many years has been to the division of landed estates, and comparatively few large holdings exist at the present time. Subdivision of property in the hands of small proprietors without capital prevents the development of practical agriculture; and in many of the departments its condition is still rude. The government has its minister of agriculture, and supports agricultural schools and veterinary establishments, while the "Journal of Practical Agriculture" and other agricultural periodicals are doing much to improve both the science and the practice of the country. With regard to the division of landed property, the same state of things prevails also in Belgium and Holland as in France, the agriculture of those countries being characterized rather as gardening than farming. The extreme care and economy of manures, and the careful application of liquid manures in these countries, are often referred to as worthy of imitation. In Germany, as already seen, the science of agriculture has been extensively developed, many of the ablest chemists having devoted their lives to this pursuit. Thaer, Schwerz, Köller, Stöckhardt, Liebig, and others, have a world-wide reputation. Here, also, as in most other countries, associated effort is made to advance the condition of agriculture.

AGRIGENTUM (called by the Greeks *Acragas;* now *Girgenti*), an ancient Sicilian city, the rival of Syracuse, on a lofty eminence on the S. W. coast. It was settled by a Doric colony from Gela, about 580 B. C. During the 5th century B. C. it attained its highest prosperity, when its population was probably above 200,000. The city was celebrated for the beauty of its architecture, both public and private. Its greatest public edifices were the temples of

Concord and of the Olympian Jupiter, of which gigantic ruins remain. Shortly after its foundation it was ruled by the tyrant Phalaris, and in the following century by Theron (488 to 472).

Temple of Concord, Agrigentum.

It was repeatedly involved in hostilities with Carthage, and in 405 B. C. was razed to the ground by an army of that nation. It was rebuilt by Timoleon, and in 210 became permanently subject to Rome, growing to be one of the most prosperous of the cities of Sicily, with a great trade in corn, wine, and oil. The Saracens captured it in A. D. 825, and kept possession of it till 1086. (See GIRGENTI.)

AGRIONIA, a yearly festival in honor of Bacchus Agrionius, anciently held at Orchomenus, Bœotia, exclusively by women and priests. The women would make a pretended search for the god, and finally desist, saying he had escaped to the muses. Then all would assemble at a repast, and amuse themselves by guessing riddles; whence collections of riddles, charades, &c., have been called "Agrioniæ." But the most remarkable part of the festival was the pursuit of a band of virgins by a priest with a drawn sword, who killed the one he caught as a sacrifice, in memory of the sacrifice of a boy by the daughters of Minyas in a Bacchic fury. In later times the killing was omitted.

AGRIPPA. I. Herodes. See HEROD. **II. Marcus Vipsanius,** a Roman general and statesman, born in 63 B. C., of an obscure family, died in March, 12 B. C. He was a schoolmate of Octavius (afterward Octavianus and Augustus), at Apollonia in Illyria, and was his chief instrument in establishing the empire. After the murder of Julius Cæsar, Agrippa accompanied Octavius to Rome, prosecuted Cassius, and received the oath of fidelity from the legions which had declared for Octavius. In 40 he took Perusia from Lucius Antonius after a long siege, and Sipontum from Mark Antony. In 38 he aided Octavianus by his victories in Gaul. In 37, after converting the Lucrine lake into a harbor, he created a fleet, with which the next year he decisively defeated Sextus Pompey at Mylæ and Naulochus. In the subsequent war against Antony he also commanded the fleet, and chiefly contributed to the great victory at Actium in 31. He accompanied Augustus to the war against the Cantabrians in Spain in 25; and in 19, being in command there, he entirely subdued them, after having in the same year pacified the Gauls, and constructed four great roads and the aqueduct at Nîmes. Agrippa was prætor in 41, consul (with Octavianus) in 37, 28, and 27, ædile in 33, and tribune from 18 till his death. During his ædileship he made great public improvements at his own expense, constructing and restoring aqueducts, erecting splendid buildings, &c.; and in his third consulship he built the Pantheon. In 16, after a journey to Jerusalem on the invitation of Herod the Great, he founded Berytus (Beyrout). He died suddenly on his return from a successful mission to tranquillize Pannonia. Agrippa was married first to Pomponia, daughter of T. Pomponius Atticus; afterward (about 28) to Marcella, niece of Augustus; and in 21 to Julia, Augustus's daughter, Marcella having been divorced at the emperor's desire. His sons Caius and Lucius by Julia were adopted by Augustus, but they both died young. His posthumous son Agrippa was also adopted by Augustus, but was afterward banished for life to the island of Planasia on account of his savage disposition, and on the accession of Tiberius, A. D. 14, was put to death.

AGRIPPA VON NETTESHEIM, Heinrich Cornelius, a German philosopher, born at Cologne, Sept. 14, 1486, died at Grenoble, Feb. 18, 1535. He was a linguist, statesman, soldier, physician, theologian, and chemist. Having engaged in some peasant insurrections in the south of France, he retreated to Paris, where he held public discourses, and the reputation he thus acquired gained him a professorship of theology at Dôle. Accused of heresy, or more probably magic, he fled to England in 1510, whence, however, he returned to Cologne, and afterward became secretary of the emperor Maximilian. He fought in a campaign against the Venetians, and was knighted on the field. Tired of this employment, he applied himself to the study of physic, lectured publicly at Pavia, held an office in Metz, and then returned to Germany. At the invitation of Henry VIII. and Francis I., he visited both England and France. He was an ardent student of alchemy and the occult sciences, in reference to which he insisted that the writings of adepts were not to be read for a literal, but for a mystical meaning. His work *De Incertitudine et Vanitate Scientiarum* (Paris, 1531) is a satire on the state of knowledge at the period in which he lived.

AGRIPPINA. I. Youngest daughter of Agrippa and Julia, and wife of Germanicus, born before 12 B. C., died A. D. 33. She was a woman of great ability, beauty, and virtue. She accompanied Germanicus in his campaigns, and once, in his absence, took the command and saved the army by preventing the breaking down of a bridge over the Rhine in a panic. After the death of Germanicus in Asia she brought home his ashes, and was met everywhere on the way with manifestations of sympathy and respect, and at Rome with unparalleled honors. But she was an object of hatred to the emperor Tiberius, and in A. D. 30 he banished her to the island of Pandataria, where she died, as is supposed, by voluntary starvation. She was the mother of nine children, one of whom was the emperor Caligula. Her sons Nero and Drusus fell victims to the tyranny of Tiberius and the jealousy of Sejanus. **II.** Daughter of the preceding, born at Cologne (hence called Colonia Agrippina) between A. D. 13 and 17, died in 59. She was gifted and beautiful, but is one of the vilest characters in history. She was first married to Cn. Domitius Ahenobarbus, and after his death to Crispus Passienus, whom she was accused of poisoning. Her brother Caligula banished her and her sister Drusilla to the island of Pontia in 39, but they were released by Claudius on his accession in 41. After the murder of Messalina she succeeded in inducing her uncle Claudius to marry her (49), the act being legalized by the senate, and to adopt her son Nero by Ahenobarbus as his successor, to the exclusion of his own son Britannicus. She then proceeded to remove all rivals and enemies by poison, and finally Claudius himself (54), his fate being hastened by an incautious threat uttered by him. After Nero's accession, having alienated him by domestic intrigues, she resorted to the most revolting means for regaining his affection; but her efforts failed, and she was assassinated by his orders in her villa on the Lucrine lake, after the failure of an attempt to drown her in a vessel purposely contrived to break to pieces at sea. She left commentaries on her own and her family's history, which were used by Tacitus.

AGUA (Sp., water), **Volcan de,** a mountain in Guatemala, Central America, 25 m. S. W. of the capital, New Guatemala. In form it is a graceful cone, its base extending over nearly all the western part of the valley of Guatemala. The traveller Stephens estimates its altitude at 14,450 feet above the level of the sea. Cultivated fields surround the base, and a belt of forest and verdure extends to the summit. The crater-like hollow on the top measures 140 by 120 yards. Its name is derived from the fact that occasionally torrents of cold water flow out of its northern side. The volcanic mountain of Pacaya lies to the S. E., and that of Guatemala to the N. W.

AGUADO, Alexandre Marie, a Parisian banker, born at Seville, June 29, 1784, died April 14, 1842. In early life he joined the Napoleonic party in Spain, held a commission in the French army, and fought for Napoleon up to the battle of Leipsic, when he quitted the army, engaged in trade and banking, and in 1823 was appointed banker for the Spanish government at Paris. He was created a Spanish marquis by Ferdinand VII., and received from Otho of Greece the order of the Redeemer. He lived in great splendor, and died worth $12,000,000. He had a gallery of very fine pictures, which were engraved and published as the *Galerie Aguado* (Paris, 1837-'42).

AGUAS CALIENTES. I. The smallest state of the Mexican republic, nearly enclosed by Zacatecas, and bounded S. by Jalisco; area, 2,216 sq. m.; pop. in 1869, 160,630. The eastern districts consist of elevated table lands, averaging 5,000 to 6,000 feet above the sea, and the western of broken mountain ranges, including the sierras of Laurel and Pinal, spurs of the Sierra Madre or Cordillera. The table lands produce abundant crops of cereals and a variety of fruits, of which olives, figs, grapes, and pears are the principal. There are a few unimportant silver and other mines within the state. It is divided into the four districts of Aguas Calientes, Rincon de Romos, Asientos, and Calvillo. **II.** The capital of the preceding state, situated upon a plain 6,000 feet above the sea, 270 N. W. of Mexico; pop. 22,534. It takes its name from two warm mineral springs in its neighborhood. The great road from Mexico to Durango and Sonora and that from San Luis Potosi to Guadalajara meet at Aguas Calientes. It is surrounded by rich gardens, abounding in olives, figs, vines, and pears, and contains churches, convents, and a hospital.

AGUE, a word denoting tremor, which has been used by medical writers in the sense of chill or rigor. Fever and ague is a popular name for intermittent fever. (See FEVERS.) Cases of intermittent fever, lacking the usual chill or cold stage, and in other respects latent, are sometimes distinguished as cases of "dumb ague." The name "ague cake" is applied to enlargement of the spleen occurring not very infrequently in the course of intermittent fever.

AGUESSEAU, Henri François d', a French jurist, born at Limoges, Nov. 27, 1668, died Feb. 9, 1751. In 1690, when only 22 years old, Louis XIV. appointed him advocate general, and in 1700 he became procureur general. He resisted the registration of the papal bull *Unigenitus*, on the ground that it encroached on the rights of the monarchy. In 1717 he was made chancellor by the regent Orleans. Almost alone he opposed Law's schemes for making the nation suddenly rich, and was dismissed, but recalled in 1720, on the bursting of the bubble. In 1722, Cardinal Dubois being appointed president of the council, D'Aguesseau retired, to be reappointed in 1737, finally resigning in 1750, at the age of 82. He endeavored to reduce the incongruous laws of France to uniformity, had an extensive acquaintance with literature, and was versed in many European languages. His writings have been published in several editions, the most complete in 16 vols. 8vo (Paris, 1819-'20); and his *Lettres inédites* appeared in 1823 (2 vols. 8vo).

AGUILAR, or **Aguilar de la Frontera,** a town of Spain, in the province and 22 m. S. by E. of Cordova, on the Cabra; pop. about 12,000. It has a trade in corn and wine, and is remarkable for its white houses and clean streets. It contains three handsome public squares and a dismantled Moorish castle.

AGUILAR, Grace, an English authoress, born at Hackney, near London, June 2, 1816, died in Frankfort on-the-Main, Sept. 16, 1847. She was descended from a family of Jewish merchants in Spain, who fled from that country on account of religious persecution, and found a refuge in England. She was instructed wholly by her father and mother. At 14 she commenced the study of history, beginning with Josephus. Her first work was "The Magic Wreath," a small volume of poems, published anonymously. At a very early age she wrote a pleasing religious fiction, "The Martyr, or the Vale of Cedars." Her other works are: "The Spirit of Judaism"; "Israel Defended," translated from the French; "The Days of Bruce," a story from Scottish history; "Jewish Faith"; "Women of Israel"; "Home Scenes and Heart Studies"; "Home Influence"; "Josephine, or the Edict and Escape"; "The Mother's Recompense"; and "Woman's Friendship." In 1835 her constitution received a severe shock from an attack of measles, which left her in a state of debility from which she never fully recovered. She died on a visit to the continent for the benefit of her health, and was buried in the cemetery of the Jews at Frankfort.

AGUIRRE. I. José Saenz de, a learned Spanish Benedictine, born in Logroño, March 24, 1630, died in Rome, Aug. 19, 1699. He was professor of theology at Salamanca, afterward secretary of the inquisition, and finally a cardinal. His principal works are: *Defensio Cathedræ Sancti Petri*, for which he received his cardinal's hat; *Sancti Anselmi Theologia* (3 vols. folio); and *Collectio Consiliorum Hispaniæ* (several editions in 4 and 6 vols. folio). **II. Lope de**, a Spaniard of the 16th century, notorious for his crimes. He left Spain for Peru, and accompanied the expedition of Orsua in quest of the imaginary El Dorado, a history of which has been written by Southey. He prompted Orsua to assume regal authority, and then killed him to usurp his place, and from this time murdered all who in any way displeased him. Being finally deserted, he was put to death by the Spanish authorities in Venezuela.

AGULHAS (Port., needles), a cape and bank on the southernmost point of Africa, about 100 m. E. S. E. of the Cape of Good Hope, in lat. 34° 51′ S., lon. 20° 2′ E. Its extreme height is 455 feet above the sea. A lighthouse was erected in 1849 upon the cape, at an elevation of 52 feet above high water.

AGUSTINA, known as the maid of Saragossa, died at Cueta, Spain, in June, 1857, at a very advanced age. She was an itinerant seller of cool drinks in Saragossa in her youth, and during the siege of that place by the French in 1808 and 1809 distinguished herself by her heroic participation in the severest encounters with the enemy. She was called *la artillera*, from having snatched the match from the hands of a dying artilleryman, and discharged the piece at the invaders. For her services during this siege she was made a sub-lieutenant in the Spanish army, and received several decorations. Byron has celebrated her in "Childe Harold."

AGYNIANI, or Agynii (Gr. ἀ, without, and γυνή, woman), a sect so called from their rejection of marriage. They flourished about the close of the 7th century, belonging to the later representatives of the Gnostic idea that the creator of the material world was an evil being, and that therefore the true Christian life consists in a renunciation and mortification of all the physical appetites and passions.

AHAB, son and successor of Omri, king of Israel, reigned from 918 to 897 B. C. He married Jezebel, the daughter of Ethbaal, king of the Sidonians. Through her influence the intercourse between Phœnicia and Israel, which had long been only commercial, now became social and religious. She introduced the worship of Baal and Astarte into the Hebrew cultus. The golden calves at Dan and Bethel had been guardedly worshipped for several years; but idolatry became under Ahab a predominant element of religious life. For his idolatrous as well as tyrannical practices, Ahab was reproved by Elijah; and as a result of the king's obstinacy, the prophet proposed the trial of Carmel. Benhadad, king of Syria, twice besieged Ahab's capital, but was defeated with great loss. Ahab came to his end by an arrow wound received while fighting in disguise in the battle of Ramoth-Gilead.

AHANTA, a narrow strip of the Gold Coast, in the kingdom of Ashantee, Africa, between lon. 3° and 2° 10′ W. On the west it is bounded by a river called Ancobra by the Portuguese, and Seenna by the natives. It is subdivided into three districts. Its most important town is Boosooa. Great Britain has several forts along the coast, including Axim and Dixcove, all but the latter ceded by the Dutch in 1872. Toward the close of the 17th century there was also a Fort Brandenburg, belonging to the electorate of that name.

AHASUERUS, the name of the Persian king whose actions are described in the book of Esther. (See ESTHER.) Two other kings of the same name are mentioned in Ezra iv. 6, and Dan. ix. 1, and supposed to be identical with Cambyses and Astyages (or Cyaxares) respectively.

AHAZ, king of Judah, 741–725 B. C. See HEBREWS.

AHAZIAH. I. Son and successor of Ahab, king of Israel, reigned 897–895 B. C. The most signal event of his reign was the revolt of the Moabites. Ahaziah, like his father Ahab, was controlled by the ambitious Jezebel, and walked in the ways of his father. He fell from a roof of his palace, and sent to the oracle of Baal-zebub at Ekron to inquire if he should recover. The prophet Elijah met the messengers on the way, and sent them back to say to the king that he should never rise from his bed. **II.** Son and successor of Jehoram, king of Judah. He reigned but one year, and during that time he was under the entire control of his mother Athaliah, the daughter of Omri, and sister of Ahab, king of Israel. He was slain (884 B. C.) by Jehu, who regarded Ahaziah as coming by blood into the scope of his commission to destroy the house of Ahab.

AHIMELECH, son of Ahitub, a Jewish high priest dwelling at Nob. David, fleeing from Saul, came to Ahimelech, and by a misrepresentation induced him to supply his wants with the shew-bread which was kept in the tabernacle. The priest also gave him the sword of Goliath. For this Saul caused Doeg to slay Ahimelech with all the priests of Nob.

AHITHOPHEL, the confederate and adviser of Absalom in his rebellion against his father David. He was famed for his sagacity and almost considered infallible. The advice of Cushai having been preferred to his by Absalom, he committed suicide by hanging.

AHLEFELD, Charlotte Sophie Luise Wilhelmine von, a German novelist, born near Weimar, Dec. 6, 1781, died at Teplitz, July 27, 1849. She married Herr von Ahlefeld, of Schleswig-Holstein, in 1798, and was separated from him in 1807. Goethe expressed a high opinion of her precocious literary talent. She published a great number of sentimental novels, under the name of Elisa Selbig and under her own name (1797–1832), as well as a volume of poetry (Weimar, 1826), under the name of Natalie.

AHLFELD, Johann Friedrich, a German clergyman, born at Mehringen, Nov. 1, 1810. He has been celebrated since 1851 as a pulpit orator at the St. Nicholas church in Leipsic. Nearly 20 volumes of his sermons have been published since 1848, and passed through many editions. He is an orthodox Lutheran.

AHLQUIST, August Engelbert, a Finnish philologist and poet, professor of philology and Finnish literature at Helsingfors, born at Kuopio, Aug. 7, 1826. He is distinguished for his philological and ethnographical investigations, especially those in respect to the dialects and races of the Uralo-Altaic family. He published the results of his researches in Finland and Russia in a work entitled *Muistelmia matkoilta Wenäjällä ruosina* 1858–'8 (Helsingfors, 1860). He is also the author of a grammar of the language of the almost extinct Wot tribe (*Wotisk Grammatik*). In 1847 he founded at Helsingfors a journal entitled *Suometar* (Finland). His collected poetry has been published under the title of *Säkeniä* ("Sparks"). He has also made Finnish translations of several of Schiller's works.

AHLWARDT, Theodor Wilhelm, a German orientalist, born at Greifswald, July 4, 1828. He is the son of the philologist and Hellenist Christian Wilhelm Ahlwardt (1760–1830), and has been since 1861 professor of oriental languages at the Greifswald university. He is a high authority on Arabic literature and history. His principal original work is *Ueber Poesie und Poetik der Araber* (Gotha, 1856).

AHMED SHAH, founder of the Afghan monarchy, born about 1724, died in 1773. Ahmed was the son of Sammaun Khan, the amir of the great tribe of the Abdallis and of the family of the Suddosis. At his father's death he and his brother Zulfucar fell into the power of Hussein Shah, the head of the tribe of the Ghiljis, who was then master of Candahar. At this period Afghanistan was subject to Persia. On the invasion of India by Nadir Shah, the two young princes were rescued from the hands of Hussein and sent into Persia. Ahmed's brother died in captivity, but he himself was taken into the service of the usurper, and promoted to the command of a body of horse. When Nadir was assassinated in 1747, Ahmed and his tribe attempted to avenge his death. But finding the Persian army too powerful, he retreated into the fastnesses of his native country, changed the name of his tribe from Abdalli to Durrani, which they still retain, raised the standard of independence, proclaimed himself shah, and was soon joined by the amirs and their several tribes. His first act was to seize a convoy of treasure coming from India to Persia, and to possess himself of the famed Koh-i-noor diamond (now in possession of the British crown), which had fallen into the hands of Nadir Shah. Aware that his power depended on finding occupation for his turbulent subjects, he led them at once to conquest, and rapidly subdued the provinces surrounding his realm and part of the kingdom of Persia. He then directed his arms to India, overran the Punjaub and Cashmere (1752), and penetrated (1756–'7) as far as Delhi, the capital of the Mogul emperor Alamghir, whither that monarch, jealous of his vizier's excessive power, is said to have earnestly summoned him. The crafty vizier, Ghazy-ed-Deen, propitiated Ahmed, and, professing entire subservience to his views, induced the Afghan monarch to leave him in possession of his ill-gotten power as a check upon his sovereign. Ahmed entered Delhi in triumph, sacked it, and invested his son, Timour Shah, with the government of the Punjaub and of Sirhind. In retiring from Delhi, he left a lieutenant to hold both the vizier and the Great Mogul in check. No sooner was the restraint of his presence removed than the minister rose on the Afghan commander, drove him out of Delhi, and assassinated the emperor, placing a prince of the blood royal on the throne. The Mahratta chieftains now saw their opportunity for expelling the Mohammedan rulers altogether, and establishing Hindoo supremacy. Ahmed Shah brought a powerful army into the field (1759). More than a year was spent in manœuvres and skirmishes, till the Mahrattas took up an intrenched position at Paniput, when Ahmed cut off their supplies, and forced them to an engagement, Jan. 6, 1761, in which the Mahrattas sustained a decisive defeat. The shah, however, saw the impossibility of maintaining the Mogul empire, and left it to its fate. The Sikh chieftains in the Punjaub revolted against him, and he crossed the Indus for the sixth time in 1762, and coerced them to a temporary obedience, which they finally threw off after a seventh expedition of Ahmed in 1763–'4, made unsuccessful by the desertion of part of his army. He was succeeded by his son Timour.

AHMEDABAD, or **Ahmadabad**, a fortified town of British India, capital of a district of the same name, in the presidency of Bombay, on the Subbermutti, 50 m. N. of the bay of Cambay, and 309 m. by railway N. of Bombay; lat. 23° 1′ N., lon. 72° 42′ E.; pop. about 130,000. The city is 6 m. in circumference, and is surrounded by high walls with towers. It was founded in 1426 by Ahmed, shah of Guzerat, as a capital. Its splendor was increased under Akbar and his successors (1572–1712); and in the 17th century it was the finest city of Hindostan. It was also noted for its commercial prosperity, having a large trade in indigo, cotton, and opium, and manufactures of gold, silver, and silk; but it was ruined by the Mahratta rule, which was not finally extinguished by the English till 1818. The most gorgeous relics of Ahmedabad are the great mosque, the mosque of Sujat Khan, the fire temple, and the tower of silence of the Parsees. The once famous gardens are nearly destroyed; but the environs are still remarkable for their beauty. Col. Briggs's work, "The Architecture of Ahmedabad," beautifully illustrated, was published in London in 1866.

AHMEDNUGGUR, or **Ahmadnagar**. **I.** A district, familiarly called Nagar, including the sub-collectorate of Nasik, in the Poona division of the presidency of Bombay, British India; area about 10,000 sq. m.; pop. upward of 1,000,000, including nearly 200,000 members of wild tribes and low castes, and 50,000 Moslems. **II.** A town, capital of the district, 70 m. N. E. of Poona, and 125 m. E. of Bombay, on the river Seena; pop. about 30,000. The fortress, one mile in circumference, surrounded by a stone wall 30 feet high, and by a broad and deep ditch, and flanked by round towers, is one of the strongest in India. In addition to stone walls, the city is defended by an impenetrable hedge of prickly pear about 20 feet high. The locality is renowned for boar hunting, and abounds in game. The malaria, formerly deadly, was removed by draining previous to 1829, when the headquarters of the Bombay artillery was established here. The city was founded in 1493 by Ahmed Nizam Shah. It was part of the Mogul empire from 1634 to 1707, when it was captured by the Mahrattas. In 1797 it was taken by Sindia, from whom it was wrested by Gen. Wellesley in 1803. Soon afterward, however, it was restored to the peishwa, and it did not finally revert to English authority till 1817.

AHN, Johann Franz, a German grammarian, born in Aix-la-Chapelle, Dec. 15, 1796, died at Neuss, Aug. 21, 1865. He was for many years a teacher in the *Realschule* at Neuss. His method for the acquisition of foreign languages became very popular. His *Praktischer Lehrgang zur schnellen und leichten Erlernung der französischen Sprache* passed through 167 editions between 1834 and 1870. Besides several manuals of the German and other languages, and hand-books of conversation, letter-writing, &c., he published in English a collection entitled "Poetry of Germany" (Leipsic, 1859), and in French *L'Allemagne poëtique* (1861).

AHRENS, Heinrich, a German jurist and psychologist, born at Kniestedt, Hanover, July 14, 1808. He studied at Göttingen, and was implicated in the political disturbances of 1831, afterward lectured in Paris on German philosophy and psychology, and from 1834 to 1848 was professor of philosophy at Brussels, declining invitations from the universities of Leyden and Utrecht. In 1848 he was a member of the Frankfort parliament and of the committee appointed to draw up a German constitution. In 1850 he was appointed professor at Gratz, and since 1859 he has been connected with the university of Leipsic, which he represents in the first Saxon chamber. He has published in French *Cours de psychologie* (2 vols., Paris, 1837–'8), and *Cours du droit naturel* (Paris, 1838; 5th ed., 1860). He published a German version of the latter under the title of *Die Rechtsphilosophie, oder das Naturrecht auf philosophisch-anthropologischer Grundlage* (Vienna, 1851). This work has also been translated into Italian, Spanish, Portuguese, and Hungarian, and is used as a basis for academical studies in Brazil, Peru, and Chili. It forms the first part of his great work *Philosophie des Rechts*. The second part contains *Die organische Staatslehre* (Vienna, 1850) and *Die juristische Encyklopädie* (1855–'7).

AHRIMAN, the name of the evil principle in the ancient Persian religion. See ORMUZD.

AHWAZ, or **Ahwuz**, a small town on the river Karun in Persia, province of Khuzistan, 70 m. N. N. E. of Bassorah, and 45 m. S. S. W. of Shuster. It is a very insignificant place, containing about 1,600 inhabitants, but it is in the immediate neighborhood of a vast collection of ruins, the remains of a city ascribed to the period of the Parthian empire, and which was very prosperous under the caliphs. It must have been a city of considerable magnitude, and the ruins extend for 12 miles along the bank of the river. Near it is a strong dam built across the bed of the river to irrigate the surrounding country; and there are remains of a fine bridge and a large palace.

AI, an ancient city of Palestine, in the territory of Benjamin, about 12 m. N. of Jerusalem, as near as can at present be determined. It is first mentioned in Scripture as the place where Abraham and Lot pitched their tents when journeying from Haran. It was captured and destroyed by Joshua, and became a heap of stones, but was rebuilt so as to be a place of some note in the time of Jeremiah.

AIDAN, St., an Irish missionary to the Northumbrians, died Aug. 31, 651. He was sent into Northumbria at the request of King Oswald about 635, and appointed bishop, with a see at Lindisfarne, where he established the monastic rule of St. Columbanus. With the assistance of the king, who acted as his interpreter, he founded the church in Northumbria.

AIDIN. I. A Turkish province, one of the eyalets of Asia Minor, embracing ancient Lydia, Caria, the western part of Lycia, and southwestern Phrygia; pop. 450,000. **II.** A city (surnamed *Guzel Hissar*, beautiful castle), capital of the province, about 57 m. S. E. of Smyrna; pop. upward of 40,000, chiefly Turks. It is picturesquely situated on the Mæander, and built out of the ruins of ancient Tralles, which was situated on the plateau of the Messogis above the town. Its important trade in cotton, figs, and other products has become still more active since the recent completion of the Smyrna-Aidin railway. The city is noted for its animation, and possesses many khans, bazaars, mosques, and palaces, as well as some interesting ruins. The American missionaries at Smyrna have a sub-mission here.

AIGUEBELLE, a small town of France, in Savoy, on the left side of the river Arc, 15 m. E. of Chambéry, where the Spanish and French forces gained a victory over the troops of the king of Sardinia in 1742. It is near the beginning of the road which Napoleon built over Mont Cenis.

AIGUEBELLE, Paul Alexandre Neveue d', a Franco-Chinese naval commander, born in France, Jan. 7, 1831. He entered the French navy in 1846, rose to the rank of lieutenant in 1858, and afterward entered the Chinese service, distinguishing himself in 1862–'4 against the Taepings. Admiral Protet and the captains of artillery Lebreton and De Moidry having been successively killed by their own raw troops, D'Aiguebelle became chief commander of the Franco-Chinese corps, compelled the insurgents to evacuate several towns, and captured Hangchow (1864). In 1865 he was made an officer of the legion of honor by the French government, while the Chinese raised him to the rank of a mandarin of the first class. He established with the aid of M. Gicquel the arsenal of Foo-chow-foo, and enabled the Chinese in less than three years to construct all kinds of European vessels. The first Chinese man-of-war is said to have been launched under D'Aiguebelle's auspices, June 2, 1869, on which occasion he was appointed grand admiral of the Chinese fleet.

AIGUILLE (Fr., needle), a name given to certain narrow and sharp-pointed peaks of the Alps, some of which rise to a great height. Also the special name of a mountain in Isère, France, between Grenoble and Gap, 6,500 feet high, which is inaccessible and called one of the seven wonders of Dauphiné.

AIGUILLON, Armand Vignerot Duplessis Richelieu, duc d', minister of foreign affairs under Louis XV., born in 1720, died in 1782. When in 1758 the English made a descent upon the coast of Brittany, the duke, who was governor of the province, threw himself into a mill, whereupon La Chalotais perpetrated his celebrated witticism, that D'Aiguillon had covered himself, not with glory, but with flour. On the accession of Louis XVI. he was replaced by Vergennes, and lived thenceforth in obscurity. During his ministry (1771–'4), which he owed to his accomplishments as a courtier and the favor of the king's mistress, Mme. Dubarry, the first partition of Poland took place. Louis XV., speaking of this act, so disastrous to the interests of France, exclaimed, "If Choiseul had been here, this partition would not have taken place."

AIGUES-MORTES (Lat. *Aquæ Mortuæ*, dead waters), a town of France, department of Gard, 3 m. from the Mediterranean and 20 m. S. S. W. of Nîmes; pop. in 1866, 3,932. It owes its name to the malarious marshes which surround it, and over which it is approached by a raised causeway. In the middle ages it had a commodious port and ship canal, where Louis IX. embarked his army for the crusades in 1248 and 1270; but they have long been filled up with sand. Several fruitless attempts have been made to restore them, the last by Napoleon I. The walls and towers then built around the town are the best preserved of any in France. In the vicinity are the immense salines of Peccais, and their products, as well as fresh and salted fish, are shipped through canals to the coast and interior.

AIKEN, a township and village in Aiken county (recently formed), S. C., on the S. C. railroad, 120 m. N. W. of Charleston, and 17 m. E. N. E. of Augusta, Ga.; pop. in 1870, 2,259, of whom 1,096 were colored. The surrounding country is somewhat hilly, the ground high, and the air dry and healthful. The climate in winter is mild, and in summer salubrious. Aiken has recently been much resorted to by consumptives and other invalids.

AIKIN. I. John, an English author, son of Dr. John Aikin, tutor in divinity at the dissenters' academy in Warrington, born in Leicestershire, Jan. 15, 1747, died Dec. 7, 1822. In 1798 he gave up the medical profession for literary pursuits. The best known of his works, in which he was assisted by his sister, Mrs. Barbauld, is "Evenings at Home," a selection of instructive essays and anecdotes for children (revised by Cecil Hartley, 1865). This is still popular, and has been translated into every European language. He was literary editor of the "Monthly Magazine" for the first 10 years after its establishment in 1796, and in 1811 was editor of Dodsley's "Annual Register." His works are very numerous. The principal are: "Biographical Memoirs of Medicine in Great Britain from the Time of Henry VIII."; "The Calendar of the Year," afterward republished as "The Natural History of the Year," remarkable for its conciseness; "England Delineated"; "A Memoir of Howard the Philanthropist," with whom he had intimate friendship; "General Biography" (10 vols. 4to). In medicine he rewrote Lewis's "Materia Medica," and some smaller works. **II. Arthur**, son of the preceding, born May 19, 1773, died in Bloomsbury, April 15, 1854. In 1797 he published the "Journal of a Tour through North Wales and Shropshire." From 1803 to 1808 he was editor of the "Annual Review." In connection with his brother Charles, he published in 1807 "A Dictionary of Chemistry and Mineralogy." In 1814 appeared the first edition of his "Manual of Mineralogy." He was for many years resident secretary of the society of arts, and contributed to its "Transactions." He was also one of the founders of the geological society, and for 36 years a fellow of the Linnæan society. **III. Lucy**, an English authoress, sister of the preceding, born at Warrington, Nov. 6, 1781, died at Hampstead, Jan. 29, 1864. After having assisted her father and aunt (Mrs. Barbauld) in their literary work, she published a poetical volume in 1810 under the title of "Epistles to Women," modelled after the style of Pope. Her most important works are her memoirs of the courts of Elizabeth (1818), James I. (1822), and Charles I. (1833), and her "Memoirs of Addison" (1843). She also wrote memoirs of her father and her aunt. She was regarded as one of the most accomplished literary women of her time, and was also celebrated for her conversational powers and her social qualities.

AIKMAN, William, a Scottish portrait painter, born Oct. 24, 1682, died in London, June 4, 1731. He spent three years in Italy, travelled in Turkey, practised his art some years in Edinburgh, and in 1723 settled in London, where he was liberally patronized, and on intimate terms with the leading spirits in art and letters. His works closely resemble those of Sir Godfrey Kneller.

AILANTUS (Malay, *ailanto*, tree of heaven, the name of one species in the Moluccas), a tree of the sub-family *ailanteæ*, which is one of the four divisions of *simarubaceæ* of Lindley. The species *A. glandulosa*, native of China, was introduced into England in 1751, and into North America about the beginning of this century. The tree resembles a gigantic stag's horn sumach, with very large leaves, unequally pinnate, and footstalks from one to two feet in length. It has many flowers on a terminal pedicel, whose anthers smell disagreeably, like animal effluvia containing phosphorus. It grows very fast, especially in poor calcareous soil, and has spreading roots. There is a resinous juice in the bark, which hardens in a short time. The wood is hard, heavy, glossy, and susceptible of a fine polish. It is propagated by root-cuttings. It sometimes has only male flowers, but in warm countries produces both male and female, and consequently fruit. *A. excelsa* is found about Delhi and further south. There are other species in southern Asia, and on the islands of the Indian ocean. The other plants of the same order are natives of tropical America, India, and Africa.

AILLY, Pierre d', or **Petrus de Alliaco**, a French prelate and theologian, surnamed the Hammer of Heretics and the Eagle of the Doctors of France, born in 1350, died in 1420 or 1425. He was distinguished as a preacher and philosophical disputant (being a leader of the nominalists), and early became a doctor of the Sorbonne, in 1384 grand master of the college of Navarre, in 1389 chancellor of the university, and in 1398 bishop of Cambrai; he was also almoner and confessor to Charles VI. His exertions led to the calling of the council of Pisa in 1409, for the healing of the papal schism, and he was one of its most active members. He was made cardinal by John XXIII. and sent as papal legate to Germany. In this capacity he took a prominent part in the council of Constance, 1414-'18, where he promoted the condemnation of John Huss and Jerome of Prague, but zealously advocated a reform in the church, maintained the superiority of councils to the popes, and aided in the election of Martin V. in place of the three rival popes. He was afterward papal legate at Avignon till his death. His published writings are numerous, including *Concordantia Astronomiæ cum Theologia*, &c., written in accordance with the astrological views of the age.

AILRED, Ealred, or **Ethelred**, an English historian and theologian, born in 1104, died June 12, 1166. He was educated at the Scottish court, entered the Cistercian order, and became abbot of Revesby in Lincolnshire, and afterward of Rievaulx in Yorkshire. His extraordinary sanctity is said to have been attested by miracles both before and after his death. His numerous works (in Latin) include a life of Edward the Confessor, an account of the battle of the Standard, and other historical pieces, published by Sir Roger Twysden in *Historiæ Anglicanæ Scriptores decem* (2 vols. fol., 1652); "Mirror of Divine Love," "Mirror of Charity," sermons, &c., partly published at Douai in 1631, and in several collections.

AILSA CRAIG, an isolated rocky islet of Ayrshire, Scotland, 10 m. off the coast at Girvan, and 25 m. S. S. W. of Ayr; lat. 55° 15′ 12″ N., lon. 5° 7′ W. It is of conical shape, about two miles in circumference at the base, and rises 1,098 feet above the surface of the ocean. Its summit can only be gained on the E. side; the other sides are nearly perpendicular, two of them resembling in structure the columns of Fingal's cave. The top is covered with verdure, and is the resort of great numbers of sea birds, goats, and rabbits; and there are the ruins of an ancient three-story tower. The island is the property of the marquis of Ailsa, who takes his title from it.

AIMARD, Gustave, a French novelist, born about 1818. He made a voyage as a cabin boy to America, and spent ten adventurous years in Arkansas, Mexico, and other parts of this continent. He next figured as a traveller and soldier of fortune in Spain, Turkey, and the Caucasus, served in the mobile guard in Paris in 1848, and eventually gave the story of his experiences and adventures in a series of novels, among which are *Les trappeurs de l'Arkansas* (1858), *Les nuits Mexicaines* (1863), and *L'Araucan* (1864). Several of his tales have been translated into English.

AIMÉ-MARTIN, Louis, a French author, born in Lyons in 1781, died in Paris, June 22, 1847. In 1815 he was appointed editing secretary of the chamber of deputies, and soon afterward professor of belles-lettres, moral philosophy, and history in the polytechnic school, of which office he was deprived in 1831. He then became keeper of the library of Ste. Geneviève. His first successful production was a semi-scientific book, called *Lettres à Sophie sur la physique, la chimie et l'histoire naturelle* (2 vols. 8vo, 1810), an agreeable mixture of prose and verse, suggested by the extraordinary success of the *Lettres à Émilie sur la mythologie* by Demoustier. He wrote a little later *La vie de Bernardin de St. Pierre*, in which the biographer happily imitated the style of his subject. His commentaries on Racine and Molière are especially interesting and tasteful. His most important work is a treatise entitled *Éducation des mères de famille*, in which he asserts that the best, or rather the only means of improving mankind, and reforming our present social organization, is to educate women in such a manner that they may be enabled to form men of character and virtue. The first part of the book is interesting, containing many practical suggestions, but the second part is much less valuable. A good translation of it has been published in the United States.—His wife, born about 1782, died in November, 1847, was a daughter of the marquis de Belleport. At the age of 18 she had married Bernardin de St. Pierre, then a widower in his 63d year. She was a favorite with many of her celebrated contemporaries, especially Lamartine, to whom she bequeathed her fortune.

AIMON, or Aymon, the four sons of, Alard, Richard, Guiscard, and Renaud, are among the most illustrious of the warriors and heroes celebrated in the mediæval romances of chivalry. Aimon is variously reported to have been duke of Dordogna, prince of Ardennes, and provincial governor under Charlemagne. Froissart seriously relates their eventful career, but by the moderns their existence has been transferred from the realm of history to that of poetry. The eldest, Renaud or Roland, is the hero of the "Orlando Furioso" of Ariosto. Their adventures with those of their single horse, famed under the name of Bayard, were probably at first oral traditions in Provence, but have been repeated in various forms in the literature of every European nation.

AIN, a department of France in Burgundy, bounded by Saône-et-Loire, Jura, Switzerland, Haute-Savoie, Savoie, Isère, and Rhône; area, 2,239 sq. m.; pop. in 1872, 336,290. The Rhône flows on its eastern and southern borders, and the Saône on the western. The eastern section of the department is traversed by mountain ranges and deep valleys. The western division is low, level, and swampy, and dotted with numerous ponds. The river Ain, an affluent of the Rhône, flows through the centre, and has many saw and grist mills on its banks. Immense rafts of timber are floated down its rapid current to Lyons. The products of the department are chiefly agricultural. Sheep are reared in great numbers in the eastern part. It is divided into the arrondissements of Bourg, Belley, Nantua, Trévoux, and Gex. Capital, Bourg-en-Bresse.

AIN-MADHI, a walled town and oasis of the Algerian desert, about 200 m. S. S. W. of Algiers; pop. about 2,000. The town is built on a rocky eminence amid gardens, surrounded by an arid plain. It is a station for caravans, and possesses a considerable trade. It was the seat of an independent Arab chief till 1852.

AINMÜLLER, Maximilian Emanuel, a German artist, founder of the modern school of glass painting, born in Munich, Feb. 14, 1807, died there, Dec. 8, 1870. His talent as a decorative and monumental architect aided him essentially in the glass paintings which, under the patronage of King Louis I. of Bavaria, he executed or restored for many of the religious buildings of Europe. He was also employed at Westminster abbey, St. George's chapel, Windsor, and St. Peter's college, Cambridge; and at the instance of Mr. Beresford Hope he executed 14 paintings for a cathedral in Ireland. Among his master works are the painted windows in the cathedral of Cologne, and those in the Vatican representing St. Peter and St. Paul. The most remarkable of his works, by their stupendous size, are in the cathedral of Glasgow. With the assistance of his surviving son and pupil, HEINRICH (born 1836), he had completed up to 1864 40 windows with upward of 100 biblical and historical paintings. He was royal inspector of the academy of glass painting at Munich. He also excelled as an architectural painter in oil, and there are many of his works in the art galleries of St. Petersburg, Munich, Vienna, and other parts of Europe.

AINOS, or Ainus (*i. e.*, men), tribes inhabiting Saghalien, Yesso, and the Kurile islands, and various adjacent regions, partly under Japanese and partly under Russian jurisdiction, the latter being generally called Kuriles. Tradition says that the Japanese were originally Ainos, and only became a distinct race by intermarrying with Chinese. The Ainos are different from other Mongolian tribes, and in their more vigorous physical formation assimilate to some extent to the Caucasian type. Though armed and painted like savages, they are inoffensive and hospitable, but shy of Japanese and Russians, especially on the coasts of the Saghalien islands, which they formerly occupied exclusively, and where the Gilanes tribe at present inhabit the N. part. The men are stout, short, with very hairy bodies, and allow the hair of the head and beard to grow to full length, which has caused them to be designated as the hairy Ainos. They are pagans, and sacrifice the first of the animals they kill, generally bears, to their idols. They are polygamists, groups of 10 to 12 families living together in miserable huts, with a chief for each group. They support themselves by fishing and hunting. The Aino language is divided into several dialects, and is regarded by Siebold as somewhat connected with the Japanese, but this opinion is not generally entertained. It is polysyllabic, has an alphabet of 47 letters, and is written in four different sets of characters, one of them, the Katakana, being sometimes called the writing of men, and another, the Hiragana, that of women. August Pfizmaier published a description of it (Vienna, 1852), and a vocabulary (1854).

AINSWORTH, Henry, an English nonconformist divine, the date and place of whose birth are unknown, died in Amsterdam in 1622. In 1590 he attached himself to the Brownist sect, and was afterward compelled by persecution to fly to Holland, where, in connection with a Mr. Johnson, he established a church at Amsterdam. He was a good Hebrew scholar, and published annotations on the Psalms and Pentateuch, together with a literal translation of the latter, a translation of Solomon's Song, and other works of a somewhat similar character.

AINSWORTH, Robert, an English teacher and scholar, born in Lancashire in September, 1660, died in London, April 4, 1743. He taught private schools in and near London, and early retired with a competency. His only claim to remembrance is his English-Latin and Latin-English dictionary, commenced in 1714 and first published in 1736. It was edited and reprinted many times, in 2 vols. 4to or folio; and abridgments of it were used in nearly all English and American schools till near the middle of the present century, when it was generally superseded by more accurate works.

AINSWORTH. I. William Francis, an English traveller, geologist, and physician, born in Exeter, Nov. 9, 1807. After having studied medicine at Edinburgh, he made geological excursions into Auvergne and the Pyrenees. In 1828 he took charge of the Edinburgh "Journal of Natural and Geographical Science," and delivered lectures on geology. He was attached to a cholera hospital in London in 1832, and afterward to various hospitals in Ireland. In 1835 he was appointed surgeon and geologist to Col. Chesney's expedition to explore the Euphrates and the route from that river to the Mediterranean, and in 1838 he was sent with Rassam and Theodore Russell, by the geological and Bible societies of London, to trace the course of the river Kizil-Irmak (the ancient Halys), and to visit the Nestorian Christians of Kurdistan. He has published "Researches in Assyria, Babylonia, and Chaldea" (1838); "Travels and Researches in Asia Minor, Mesopotamia, Chaldea, and Armenia" (2 vols., 1842); "The Claims of the Christian Aborigines in the East"; "Travels in the Track of the 10,000 Greeks" (1844); the "Illustrated Universal Gazetteer" (1861-'3), &c. **II. William Harrison,** an English novelist, cousin of the preceding, born in Manchester, Feb. 4, 1805. His father was an attorney, and he was intended for the law, but from an early age he exhibited a strong taste for literature. A novel, "Sir John Cheverton," which he produced in 1825, was shown to Sir Walter Scott, whose praises encouraged Ainsworth to pursue the course he had thus commenced. In 1834 his "Rookwood" appeared, founded on the adventures of the noted highwayman Dick Turpin; and the popularity of this novel induced him to bring out "Jack Sheppard." The robber school of romance having fixed Mr. Ainsworth's celebrity, he turned to a more wholesome style of literature, and produced various novels of local interest, in which historical characters are introduced and very freely dealt with. Such are his "Tower of London," "Guy Fawkes," "Old St. Paul's," "Windsor Castle," "The Constable of the Tower," and "Cardinal Pole." In 1845 he became proprietor of Colburn's "New Monthly," which he still conducts (1872); and for a few years he also edited a second periodical called "Ainsworth's Magazine." His most recent novels are "The Miser's Daughter" (1869), "Hilary St. Ives" (1870), and "Boscobel, or the Royal Oak" (1872).

AINTAB (according to some, the ancient *Antiochia ad Taurum*), a city of Asiatic Turkey, in the vilayet of Aleppo, and about 70 m. N. by E. from Aleppo; pop. estimated at from 35,000 to 48,000, including 12,000 Armenians. It has large manufactures of silk, leather, and cotton goods, and the mountain fort which is connected with it makes it an important military point. Aintab is one of the centres of the American Protestant missions, and in 1869 had 1,900 registered Protestants. It was conquered in 1183 by Saladin, and in 1400 by Timour. Near Aintab is the village of Nizib, where Ibrahim Pasha on June 24, 1839, obtained a great victory over the Turks under Hafiz Pasha.

AIR (Gr. ἀήρ, Lat. *aer*), a term now limited to the atmospheric air. See ATMOSPHERE.

AIR, or **Asben,** an oasis in the desert of Sahara, situated between lat. 16° and 20° N., and lon. 5° and 10° E. It is bordered by the territory of the Kelowi Tuariks on the north, and by Soodan, or Negroland, on the south. Dr. Barth terms it the Switzerland of the desert, and the frontierland of negrodom. Its northern borders are infested by a savage race who rob and often murder strangers passing through the country. In the north is the mountain group of Gunge, 5,000 feet above the level of the sea. Vegetation thrives in the valleys; it is the northern limit of the doum palm; there are groves swarming with ring doves, hoopoes, and other birds, and highlands abounding in asses and goats. To the south are the groups of Mt. Bunday, Eghellal, Anderas, and Baghzen. A desert plateau, with an average elevation of 2,000 feet, the home of the giraffe, wild ox, and ostrich, divides Air from Soodan. The inhabitants of Air are blacker and shorter than those of Azkar, and, instead of the austere and regular northern features, have a rounder and more cheerful expression of countenance. The principal places are Agades and Tintellust. This is probably the most southern place in central Africa where the plough is used; for all over Soodan the hoe is the sole implement for preparing the ground. The government of the country is presided over by the sultan of Agades, and his chief vassal is emir of Tintellust. The inhabitants are fanatical Mohammedans. If a man marries a woman of another village, he must go and live in her village, not she in his. The hereditary power does not descend to the son, but to the sister's son. The arms, in general, are the spear, the sword, and the dagger, and an immense shield of antelope hide; some use bows and arrows. A few only have muskets, and those few keep them for show rather than actual use. The valleys are but poorly cultivated, and every piece of clothing material has to be imported, the population being sustained in large part by the salt trade of Bilma. The tolls levied on this article, in return for protection afforded, constitute almost the whole source of revenue to the sheiks of Tintellust, Loosoo, and others. The name Air first appears in the description of Leo Africanus, written in 1526. It was introduced by the Berber conquerors, as Asben is the aboriginal name still used by the black and mixed population.—See Richardson's "Journal of a Mission to Central Africa" (London, 1853), and Dr. Barth's "Travels in Central Africa" (London, 1857).

AIR BLADDER, an organ in some kinds of fishes, commonly called by fishermen the "swim." Fishes endowed with great powers of locomotion, and accustomed to pass rapidly from the surface to the bottom of the ocean, and vice versa, are provided with an air bladder or a swim, by which they can modify at will the specific gravity of their bodies in the water, as birds do in the atmosphere by admitting air when they wish to rise, and by expelling it as they descend. Not that fish draw air into their swims and expel it, as birds do in their quills, &c., but they have the power of generating gas to fill the swim like a balloon within the body when they wish to ascend in the water, and expelling it when they descend. Fishermen are well acquainted with the functions of the bladder in the cod and other species, which require to be brought fresh to market at a great distance from the place where they are caught; they perforate the air bladder with a fine needle, allowing the air to escape, and thus rendering the fish unable to rise from the bottom of the well-boats where they live for a considerable time, while brought to market. Cod sounds are the salted air bladders of these fishes. The Iceland fishermen, and those of Newfoundland, prepare isinglass from cod sounds; and the Russians make a superior kind of isinglass from the sounds or swims of the sturgeon. The swim is composed of a lengthened sac, sometimes simple, as in the common perch, or divided into several compartments by transverse ligature, as in the trout and salmon; sometimes furnished with appendices, more or less numerous in different species. It is composed of a thick internal coat of fibrous texture, and a thin external coat, the whole being enveloped in the covering of the intestines. The swim has in many species no external opening, and the air or gas with which it is distended is supposed to be secreted in such cases by a glandulous organ with which it is always provided. In fresh-water fishes the air bladder communicates sometimes with the œsophagus and sometimes with the stomach, by means of a small duct or tube; and in these instances no secreting gland is found. A very few species, among which is the common eel, have air bladders opening by an external duct, and also provided with secreting glands. Fishes deprived of their air bladders sink helpless to the bottom of the water, and there remain. All the different species of flat fish, such as skates, soles, turbots, brills, &c., which live only on the coasts and on sand banks at the bottom of the ocean, where they find their food, have no air bladders; their bodies are heavier than water, and their mode of life does not require them to ascend. Mackerel and other species, which find their food entirely on the surface, and remain there, have no air bladders; their bodies are comparatively light, and they need not sink low down in search of food. Some zoölogists have supposed that the air bladder of fishes may be connected with the respiration, and it is now generally admitted to be a rudimentary lung. Much remains to be yet observed with regard to the relation of this organ to the general conformation of fishes; for it is sometimes found in one species, and entirely absent in another which belongs to the same genus.

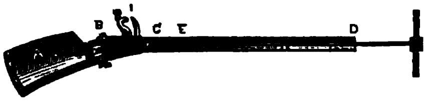
AIR CELLS, hollow spaces within the cellular tissue of the stems, leaves, and other parts of plants, containing air only, the sap and other matters being contained in different receptacles. They most frequently occur in water plants, and very conspicuously in the splendid *Victoria regia* of the lakes of South America, enabling its rosy leaves to float; and in the *Vallisneria spiralis*, of which the male specimens, immersed in the water, rise from the bottom to meet the long-stalked females which stand over the surface. Other receptacles of air are to be found in the cambium (the layer of gelatinous cellular tissue between the wood and the bark) of trees. Here the longitudinal rows of cells become broader, and exhibit in the progress of growth small flat air bubbles between the walls of the contiguous cells; gradually the bubbles become globular or oval, and after the cell walls have increased in thickness, a small canal is formed within the new mass, giving rise to porous vessels. This is readily observable in limes and willows. The air bubbles obstruct the passage of the sap, and thus cause the consolidation of the wood. The difference between the wood of needle-leafed trees (such as the pine, fir, spruce, larch, &c.) and of broad-leafed trees chiefly depends upon the number of the cells that are converted into porous vessels.

AIRDRIE, a borough town of Lanarkshire, Scotland, 11 m. E. of Glasgow; pop. in 1861, 12,922. It is well built, and has recently grown into importance from the extensive coal and iron mines in the neighborhood, and also from its proximity to Glasgow, whence many of its weavers obtain employment. The laird or proprietor of the estate of Airdrie is Mr. A. J. Alexander, a native and resident of Kentucky, famous as a breeder of fine horses and cattle in Woodford county.

AIRE, a river of Yorkshire, England, rises near Settle, flows S. E., passes Leeds, and receives the Calder at Castleford; and the two, having been widened and deepened, form one of the links in the canal system of Yorkshire and Lancashire, under the name of the Aire and Calder navigation. From Castleford, the Aire flows E. to the Ouse near Goole.

AIRE. **I.** A fortified city of N. E. France, department of Pas-de-Calais, on the Lys, 8 m. S. S. E. of St. Omer; pop. in 1866, 8,803. It is well built, and has a highly ornamented church. There are manufactures of linen, hats, soap, Dutch tiles, &c. The surrounding district is one of the richest in French Flanders. **II.** A city of S. W. France, department of Landes, on the Adour, 80 m. S. by E. of Bordeaux; pop. in 1866, 4,885. It is a very old place, was formerly strongly fortified, and has suffered much in foreign and civil wars. It was the residence of Alaric II., and has been a bishop's see since the 5th century.

AIR GUN, a pneumatic engine resembling a musket, for the purpose of discharging bullets by means of compressed air. It consists of a lock, stock, barrel, and ramrod. The stock is made hollow, and provided with proper cocks for filling it with compressed air by means of a force pump. The lock is nothing but a valve which lets into the barrel a portion of the air compressed in the stock, when the trigger is pulled. The gun is loaded with wadding and ball in the ordinary way, and the air suddenly introduced from the stock propels it with a velocity proportional to the square root of the degree of compression of the air. There is no doubt that if the discovery of powder had not been made at an early date, these instruments would have reached a point of great effectiveness. The section of the air gun given here represents one of the most practical kind. It has the general form of a musket. The stock A is hollow, and strong enough to withstand the required pressure of the air, being some 50 atmospheres, pumped into it by means of the piston E, moving in the barrel C D; this compressed air is confined in the stock by the spring check valve C. The action of the lock I is such that when pulling the trigger the valve C is for an instant lifted from its seat, which causes a small portion of the air to escape; and as this air is confined under a pressure of some 50 atmospheres or 750 lbs., the impulse given to the ball at the first discharge is almost as great as that of gunpowder. One charge may fire several balls, but the effect decreases with every firing. Some air guns have, in place of a hollow stock, a separate large hollow metallic ball into which the air is compressed, and which is attached to the side of the lock. These are generally very unsafe.—Arms analogous to air guns have been contrived for producing explosion, with nearly or quite the power of an ordinary musket, by the electrical conversion in the barrel of oxygen and hydrogen, or air and street gas, into steam, and other similar means.



Air Gun.

AIR PLANTS, a term applied to some species of the families of *Bromeliaceæ* (*Tillandsia usneoides*, hanging in festoons from the forest trees of tropical America, moss-like, and *T. xiphioides*, perfuming the balconies of houses in Buenos Ayres, &c.), and of *orchidaceæ* (namely, the parasitic groups of them, such as the *aërides*, *arachnides*, or *flos aëra* of the East Indies, and many others), because of their being able to live for a considerable time, suspended in the air, without apparently receiving any nutriment. The hot, damp, and shady forests of the torrid zone in Asia, Africa, and America, abound in gracefully and grotesquely shaped and deliciously scented species of *orchideæ*, so that in Java alone there are nearly 300 varieties. During the dry season, which is that of repose, corresponding to our winter in this respect, these parasites wither, lose their leaves, and seem to be dead; but as soon as the gentle, preparatory rain begins to fall, they revive, and become fully developed into their glorious existence by the ceaseless showers that transform the whole surface of the country into a magnificent hothouse. They are attached, amid gigantic grasses, ferns, and numberless climbers, to trees, rocks, &c., and are nourished by the continual warm vapors that fill the forests. Stagnant water is injurious to them, even by mere proximity. The roots of most fully developed air plants, by which they cling to their supports high in the air, have an outer parchment-like layer, in which the spiral cells exhibit detached fibres and simple walls; thus in *oncidium altissimum*, *epidendron elongatum*, &c. In order to enjoy these beautiful plants in our houses, we must surround them by the natural circumstances in which they prosper, viz.: rotten wood, a very little chopped moss, and fragments of flower pots for soil, with heat, damp air, light, absence of stagnant water and of impurities.

AIR PUMP, in natural philosophy, a machine for exhausting the air from a vessel. The first machine of this kind was made in 1650 by Otto von Guericke, burgomaster of Magdeburg, shortly after Galileo had discovered that air was ponderable. Since then this instrument has been much improved, principally by Hook, Papin, Boyle, Babinet, Richard, and Deleuil. In its most approved form it consists of a circular brass plate, on which is placed a bell-shaped glass vessel. The interior of this vessel communicates through a tube opening in the centre of the plate with the pump cylinders. The rim of the glass vessel, called the reservoir, is ground perfectly flat, and a little lard is rubbed upon the edge before it is applied on the brass plate, which is likewise ground flat. Thus an air-proof joint is formed. Valves, placed either on the piston or on the cylinders, a stopcock on the pipe, and a mercury vacuum gauge, communicating with the reservoir, complete the machine. At each stroke of the piston, a cylinder full of air is expelled on one side the piston, and the air of the reservoir expands to fill the space on the other side; at the return stroke, this air is expelled in its turn, and so on. The air of the reservoir becomes more and more dilated till the moment when a full cylinder of it, compressed into the small space necessarily left between the piston and the cylinder bottom, has not a sufficient pressure to open the valve; that is to say, when this pressure is less than 14 pounds to the square inch, which is the pressure of the atmosphere acting on the other side of the valve. For this reason these valves are made as light and delicate as possible, and since the beginning of this century they have been made simply of a strip of oiled silk stretched over one or more of the small holes, through which the air can thus only pass in one direction. As by every stroke of the piston the air divides itself equally between the reservoir and the pump cylinder, it is evident that every stroke takes out of the reservoir only a certain fraction of that which is left in it; if, for instance, the capacity of the cylinder is $\frac{1}{30}$ of that of the reservoir, the 30th stroke will by no means take out the last 30th part, but only the 30th part of the air left by the former stroke. As a consequence of this principle of action, a perfect vacuum cannot be produced by any air pump, but it will be approximated more or less according to the perfection of its workmanship. In this workmanship an important point to be observed is, that if at the lowest portion of the piston there is any space left between it and the cylinder, this space will of course remain filled with some air after the downward stroke of the piston; at the succeeding upward stroke this air will expand, and may fill the cylinder to the same extent as the vessel to be exhausted; this will prevent the opening of the valves, and any further motion of the pump will become useless. It is therefore necessary to avoid this so-called "dead space" in air pumps; a precaution not necessary in pumps for liquids, as these are solid and not elastic like air.—

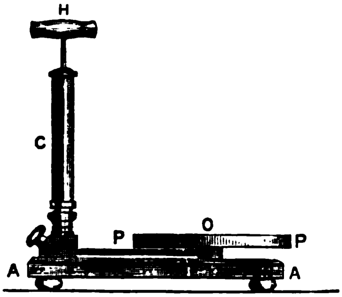


Fig. 1.—Simplest Form of Air Pump.

An apparatus so extensively used for a great variety of purposes has of course undergone a great many modifications and improvements. We will only describe some of the principal types, commencing with the oldest and most simple. In fig. 1, C is the brass cylinder in which the piston is moved up and down, by means of the handle H. This cylinder is attached to a wooden base A A, which carries also the plate P P, on which the vessel to be exhausted is placed. The hole O in the centre of the plate connects by means of a tube with the lower part of the cylinder C. At the bottom of this cylinder is a cock to admit the air again into the exhausted vessel; there is a valve above this cock, and another valve in the piston, both opening upward. The first air pumps made by Von Guericke were similar, only his cylinder was horizontal and his piston solid, and in place of valves he had stopcocks which had to be turned at every stroke. It is evident that in this pump only the up stroke requires labor, a portion of which is lost in the beginning of the down stroke, when the atmospheric pressure causes

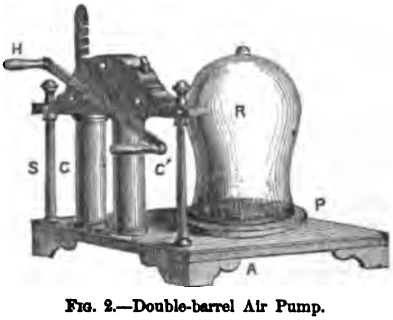


Fig. 2.—Double-barrel Air Pump.

the piston forcibly to descend for a portion of its motion. To prevent this loss of labor the double-barrel air pump has been contrived, represented in our second figure. By means of a ratchet wheel moved through about 180° by the double handle H C′, the pistons are alternately raised and depressed in the cylinders C C′ attached to the base A, which also carries the plate P, with the so-called receiver R, which is the strong glass vessel into which the objects to be experimented upon are placed. An important improvement in such air pumps was the imitation of the manner of working of the steam piston and cylinder, namely, closing the top of the cylinder hermetically, by means of a packing box surrounding the piston rod, and the placing of a valve in this upper cylinder head, so as to give a pump with a single cylinder three valves, all opening upward—one in the piston, and two at the top and bottom of the cylinder. In this way the atmospheric pressure does not act on the piston during the downward stroke, as then the top valve closes, and a partial vacuum is formed over the piston, which is filled by the air under the piston passing through its valve. Such air pumps are represented in figs. 3 and 4. A is the base; C the cylinder; P P the plate; S the support for the handle H; E an oil cup, attached to a cap over the top valve, to receive the lubricating fluid which the upward motion of the piston may throw out of the top valve; and R is the receiver, containing the apparatus prepared to demonstrate that the sound of a bell is not transmitted through a vacuum. In order to ease the labor when such a pump has to be used continuously, a fly wheel may be attached, working by means of one or more cranks one or more pistons, as in fig. 4. Babinet made such pumps, in which the air from one cylinder was thrown into a second; and Richard in Paris makes pumps with series of barrels, say eight to each pump, all moved by one axle with cranks. These remarkable pumps possess some other peculiarities, described in Prof. F. A. P. Barnard's report on the Paris exposition of 1867.—In order to do away with the great friction of a close-fitting piston in the barrel, Deleuil made a pump in which the piston does not touch the barrel at all, but leaves a very narrow space between. In order to guide its motion without contact, it has, besides the upper piston rod which moves it, another piston rod with packing box below passing through the under cylinder head. To prevent the air from passing the piston, the latter is a cylinder of great height, nearly half the length of the barrel, and around its circumference are a great number of circular grooves, each of which has to be filled with air before this can pass to the next groove, which takes much more time than each stroke of the piston, so that the pump works as if the piston were tight fitting. But the grooves, filled with air at each stroke, act as so much dead space, and thus as a slight imperfection. Kravogel, of Tyrol, makes his air pump pistons like those of the pump of an hydraulic press, of a simple solid thick iron cylinder, passing through a stuffing box into a barrel which is wider, and in which the space between the two is filled with mercury, thus absolutely annulling all dead space.—Early attempts to produce a vacuum on the Torricellian principle (see **Barometer**) failed, but Geisler succeeded in constructing an air pump on this principle; it is now one of the most valuable tools in the philosophical cabinet. (See figure 5.) The glass tube C, of which the length is about equal to the height of the barometrical tube (30 inches), contains on the top a glass vessel A, while its lower end is connected by a flexible tube D with the glass vessel B. The glass vessel A is connected with a tube T R, provided with a double-way stopcock O P, which

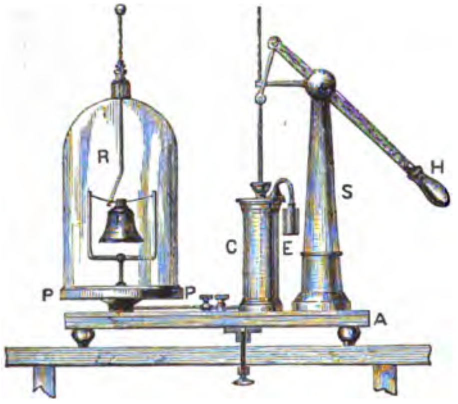


Fig. 3.—Improved Modern Air Pump.

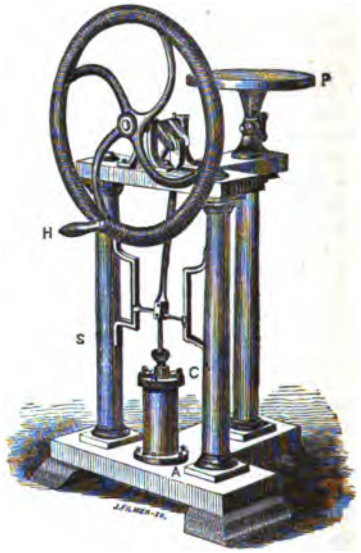


Fig. 4.—Large Improved Air Pump of Ritchie.

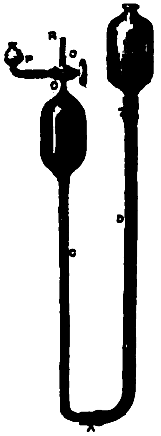


Fig. 5.—Geisler's Mercurial Air Pump.

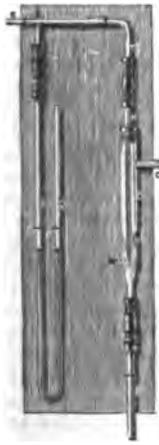


Fig. 6.—Bunsen's Air Suction Pump.

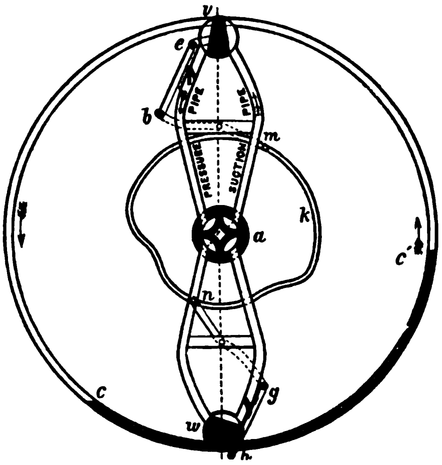


Fig. 7.—Doyle and Martin's Rotary Air Pump.

allows a connection between T and R or between T and the glass ball P; when, in the latter condition, the vessel T is raised so high that the mercury enters the ball P, then of course all air is expelled from T. When, now, the cock O P is turned so as to establish the connection between T and R (R being joined to the vessel to be exhausted), and if at the same time the vessel B is lowered so that the surface of the mercury in it is 80 inches below T, the mercury in the latter will descend and fill B, while the vacuum in T will withdraw the air from the vessel to be exhausted. The cock O P is then turned again and B raised, which will expel the air through P, and the operation is repeated. Babo has modified this apparatus by substituting valves for the stopcock, while Poggendorff has contrived a very useful combination of this instrument with the ordinary air pump.—Bunsen uses falling water to carry the surrounding air with it (see Adhesion of Liquids to Gases), and in this way produces a steady exhaustion of air or vapor from vessels requiring such constant removal. It consists of a wide glass tube D, in which a narrower tube reaches downward to N, connected at the top by a well fitting cork M. Water is carried in by a side branch C, connected by means of an india-rubber tube B, closed by a spring H, with a tube A drawing water from a reservoir. The current of this water going down in the tube D around the inner tube, will produce a suction, drawing the air from T and S, and from any vessel connected with S. To increase the effect, the wide tube D is connected below with a lead tube F, which reaches 20 to 80 feet down; and this long descending column of water acts like a powerful continuous piston. The amount of rarefaction is ascertained by the difference in the height of the mercurial columns in the syphon barometer P Q. This apparatus is used for driving liquids through filters by atmospheric pressure, for drying in vacuo, &c. Some experimenters, in order to economize water, reverse the operations of the tubes and pass the water out of the central narrow tube, while the suction takes place through the wide tube, in which case the water is passed in at S, while the exhaustion takes place by A; in this case the barometer P Q is also connected with A.—One of the most ingenious inventions of this kind is the rotary air pump of Doyle and Martin of New York. It consists of a wheel of which the rim is a hollow tube, filled in its lower portion with mercury, *c c′*, fig. 7; this mercury performs the function of a perfectly fitting piston, with a minimum of friction. When the wheel is revolved rapidly around its axis, the heavy mercury remains of course in its lower portion. The hollow rim possesses two or more stopcocks, *v w*, which in one position allow the mercury to pass, as represented below at *w*, and in another position close the communication between the two sides, and bring each in connection with one of the hollow spokes, as seen at *v* in the top; the position of these cocks is regulated by the levers *m b e* and *n g h*, worked by the stationary grooved cam *k*. If, now, the whole wheel revolves rapidly in the direction of the arrows, the upper cock, being closed, will compress the air at the left side and cause an exhaust at the right side, while the mercury remains below as the cock *w* is open; the two curved spokes, marked "pressure pipe" and "suction pipe," will thus perform their respective functions, till the valve, having reached the mercury below, opens to let the latter pass, closing at the same time the pressure and suction pipes; then the lower cock *w* will become the upper, and while closing perform its functions. The wheel turns on two hollow trunnions, the one in front being connected with the suction pipe, the one behind with the pressure pipe. During rotation the axis will thus perform a continuous suction and pressure, which in order to be considerable requires a wheel of large dimensions; 30 inches difference in the height of the mercury at the two sides corresponding with our atmosphere, a wheel of at least 5 feet diameter is required to produce a vacuum, while if pressure is also required, double and triple these dimensions must be given. The inventors had recently such apparatus in operation with a wheel of 16 feet diameter and containing 2,000 lbs. of mercury. —Air pumps are used by professors of natural philosophy, to show that in a vacuum combustion is arrested, smoke falls like lead, cold water boils, warm-blooded animals die rapidly, fermentation is stopped, &c. The celebrated process of Appert for the preservation of alimentary substances is founded on the last mentioned property; but the necessary vacuum is produced, not by using an air pump, but by boiling the boxes of preserves, thus producing steam that expels the air, and then quickly soldering up the hole while the steam still fills up the space, and before the air is given time to enter; the vacuum will be produced after cooling while the steam is condensed to water. Air pumps are at the present day also used in many manufactories. The sugar refiners use it for the rapid evaporation of the syrup at low temperatures; and the condensation of milk is performed by means of large air pumps. The artificial manufacture of ice, and artificial cooling by the use of power, are always accomplished by the intervention of powerful air pumps, whether air itself is alternately expanded and compressed, or use is made of volatile liquids, as ether, ammonia, and chymogene, which by evaporating in a vacuum produced by the air pump generate the most intense artificial cold. Many chemical preparations also require the constant use of a vacuum, or at least of very rarefied air, for which reason the air pump is one of the most important tools in all manufactories of chemicals, as well as in the chemical laboratory. Recently the use of the air pump has been introduced for the preservation of wood and other porous material, by first exhausting the air from the pores, so as to force the preserving liquids in by atmospheric pressure. For manufacturers of aneroid barometers, sympiesometers, Geisler's tubes, and other physical instruments, the air pump is also an indispensable tool. Finally, one of the most important applications of the air pump is that to the low-pressure steam engine; it is used to pump out of the condenser the condensed steam, the water introduced for condensing, and the air that has come out of this water when warmed by the condensation of steam. This application of the air pump is one of the inventions of Watt.

AIR VESSELS, or properly **Spiral Vessels**, are supposed by some botanists to be the only formation by which air is conveyed into the vegetable system; but air has access to many parts of the plant by means independent of the spiral vessels. Spiral vessels differ from spiral cells (or vermiform bodies) only by dimension, so that there is a constant transition from the latter into the former. Both are quite as frequently filled with sap (in the youngest portions of the plant) as with air (in the full-sized organs). They are first perceptible in the bud. The spiral vessels of the wood are to be distinguished from those of herbaceous plants, both as regards their origin and their function. The latter has not yet been fully explained, owing to the diversity of views entertained by different inquirers. Spiral formation begins when the simple cell membrane ceases to exist. This, as well as all other transitions from one form to another, is accompanied by modifications and changes of the chemical constituents of the vegetable body. In some cases the air in the cavities of the plant contains more oxygen than the atmospheric.

AIRY, George Biddell, astronomer royal of England, born at Alnwick, July 27, 1801. He was a fellow of St. John's college, Cambridge, and afterward of Trinity. He was appointed Plumerian professor of astronomy at Cambridge in 1828, and annually published the results of his investigations at the observatory there (9 vols. 4to, 1829-'38). On the retirement of Mr. John Pond in 1835, he became astronomer royal, which office he continues to hold (1872). He is president of the astronomical society, and in 1871 was elected president of the royal society. He distinguished himself by the publication of the long-neglected observations at Greenwich of the moon and planets from 1750 to 1830. His labors are regarded as having opened a new epoch in planetary astronomy. He has acquired high reputation by his researches into the mode of simplifying the theory of planetary perturbation, by his contrivance of a new instrument for observing the moon off the meridian, and substituting for the old mural circle and transit instrument another of simple construction and of great utility. In 1854 he corrected certain erroneous impressions which prevailed touching the variations of the compass in ironclads. In 1859 his memorable researches on the motion of the solar system in space were first announced. He prepared the formula and methods for conducting the survey of the Maine boundary between Canada and the United States. He observed eclipses of the sun at Turin (1842), at Gothenburg (1857), and in Spain (1860). His important contributions to astronomy, magnetism, meteorology, photography, and other sciences are contained in leading English cyclopædias and in the annals of learned societies. In his "Essays on the Invasion of Britain by Julius Cæsar" (London, 1865), Prof. Airy questions the accuracy of D'Anville's, Rennel's, and Halley's theories about the points of Cæsar's sailing and landing; he regards the points of departure to have been so far from Calais as the mouth of the Somme, and the place of landing so far from Deal as Pevensey bay.

AISNE, a department in the north of France which takes its name from the river Aisne, an affluent of the Oise. It consists of portions of Île de France, Brie, and Picardy, and is bounded by the departments of Le Nord, Ardennes, Marne, Seine-et-Marne, Oise, and Somme, and Belgium. Area, 2,838 sq. m.; pop. in 1872, 552,439. It is traversed by the Oise, Aisne, Ourcq, and Marne. The surface is mostly flat, and the soil fertile. It is divided into the arrondissements of St. Quentin, Laon, Château-Thierry, Soissons, and Vervins. Capital, Laon. The quantity of farm produce and live stock exceeds that of most parts of France. A profitable trade is carried on in pressing oil from the beech mast of the extensive forests. Several of the towns are noted for their manufactures. The mirrors of St. Gobain are known throughout France.

AISSÉ, Mlle., a Circassian lady, born in 1694, died in Paris in 1733. When she was four years old the count de Ferriol, French ambassador at Constantinople, purchased her from a slave dealer, who stated that she was the daughter of a Circassian prince. The count had her educated at Paris, under the superintendence of his sister-in-law, but he afterward seduced her. Though she repulsed the brilliant offers of the dissolute regent, the duke of Orleans, she indulged a guilty passion for the chevalier d'Aydie, a knight of Malta. Her letters contained interesting anecdotes relating to the court and to contemporary personages, and were thought worthy by Voltaire of being published, accompanied by annotations of his own (1787). In 1806 they were collected, together with those of Mmes. de Villars, La Fayette, and De Tencin (Paris, 3 vols. 12mo).

AITKIN, a new county of E. Minnesota; area, about 950 sq. m.; pop. in 1870, 178. Part of Lake Mille Lacs occupies its W. corner. The route of the Northern Pacific railroad extends through the N. part of the county.

AITON, William, a Scotch gardener and botanist, born near Hamilton in 1731, died at Kew palace, Feb. 1, 1793. He emigrated to England in 1754, and in 1759 obtained the management of the royal botanical garden at Kew, and in 1783 also that of the pleasure garden. Under his care Kew gardens became the principal scene of botanical culture in the kingdom. In 1789 he published his *Hortus Kewensis* (3 vols. 8vo), in which 5,600 species are described. The system of arrangement adopted is the Linnæan, and the author indicates the origin, mode of culture, and the epoch of introduction into England, of each species. He was assisted in this task by two learned Swedes, Dr. Solander and Mr. Jonas Dryander. He was succeeded by his son, William Townsend Aiton, who retired in 1841, and died in 1849, aged 84.

AITZEMA, Lieuwe van, a Dutch historian, born at Dokkum, Nov. 19, 1600, died at the Hague, Feb. 23, 1669. His great work is *Zaaken van Staat en Oorlog in Ende omtrent de Vereenigde Nederlanden* (14 vols. 4to, 1657–'71; 7 vols., 1669–'72). It is chiefly valuable on account of the numerous original documents, referring to the period 1621–'68, which it contains. Aitzema was actively engaged in political affairs, and in his latter years was agent of the Hanseatic towns at the Hague.

AIX, a town of southern France, department of Bouches-du-Rhône, 15 m. N. of Marseilles; pop. in 1866, 28,152. It is the see of an archbishop, and possesses a museum and one of the best provincial libraries of France, containing 100,000 volumes. It was the Aquæ Sextiæ of the Romans, so called on account of its thermal springs by Sextius Calvinus, who founded it after a victory achieved there over the Gauls, 123 B. C. Between Aix and Arles is the battle field on which Marius gained his great victory over the Teutons, 102 B. C. The counts of Provence made Aix their capital. The town is handsome, and adorned with a beautiful promenade. The cathedral, the clock tower in the market place, containing a curious clock, and the hôtel de ville, are fine specimens of middle-age architecture. The mineral baths are but little frequented; they are impregnated with sulphur, and are said to soften and improve the skin.

AIX-LA-CHAPELLE (Ger. *Aachen*), a town of Rhenish Prussia, capital of the administrative district of the same name, 43 m. by railway W. S. W. of Cologne; pop. in 1871, 74,238. It is pleasantly situated on rising ground, is a centre for Rhenish industry, and is the focus of an important net of railways connecting Belgium, Holland, and Germany. The annual export of cloth to the United States amounts to about $1,500,000. The Aachen-Munich fire insurance company and the savings bank are the greatest enterprises of the kind in Germany. The value of mineral products furnished by one of the joint-stock companies amounted in 1869 to 2,491,000 thalers. Railroad iron is manufactured to a very large amount, and there are also flourishing manufactures of woollens, silks, hosiery, shawls, buttons, clocks, pins, railway and other carriages, tobacco, and cigars. A polytechnic school for the Rhenish provinces and for Westphalia was opened Oct. 10, 1870. The town is handsomely built, and contains a fine Gothic town house, and a beautiful cathedral, in which is the tomb of Charlemagne, who made this his favorite residence. A collection of famous relics, presented to Charlemagne by the patriarch of Jerusalem and the caliph Haroun-al-Rashid, is kept in a tower at the west end of the cathedral, and exposed to public view once in seven years. Until 1558 all the German emperors were crowned here, and their portraits, together with Charlemagne's chair and many other interesting historical memorials, are preserved either in the cathedral or in the town hall. The imperial insignia were removed to Vienna in 1793. The burghers enjoyed rare exemptions and privileges until the reformation, which was warmly espoused by the citizens. After desperate contests, however, the Catholics, with the aid of Spanish soldiery from the Netherlands, suppressed Protestantism, and the privileges were taken away from the city. The population is now Catholic, excepting about 3,000 Protestants and 400 Jews. A magnificent monument in commemoration of the warriors of 1866, by Friedrich Drake, was inaugurated in 1872.—Aix-la-Chapelle is renowned for its mineral baths, which were known to the Romans, by whom the place was called Aquisgranum, either from an epithet of Apollo, to whom thermal springs were sacred, or from Severus Granius, a Roman commander about A. D. 125. The waters contain sulphur, and have a heat of 131° F. They are very beneficial in skin and paralytic affections. In the suburb of Borcette (Burtscheid) there are also springs, both hot and cold, which are not impregnated with sulphur.—**Treaty of, 1668.** At the death of Philip IV. of Spain, 1665, Louis XIV., his son-in-law, asserting a claim to parts of the Spanish dominions in right of his wife, Maria Theresa, under the Brabant laws of devolution, commenced the war of succession and seized the province of Franche-Comté, together with several fortresses and strongholds in the Netherlands. The Spaniards were unable to make head against such commanders as Condé and Turenne, and Holland, alarmed at the progress of the French, concluded the triple alliance with England and Sweden. Louis accepted mediation in preference to the alternative of arms, and a congress at Aix-la-Chapelle ended in a treaty, May 2, 1668, by which Franche-Comté was restored to Spain, but several of the strong towns in the Netherlands, including Lille and Valenciennes, were retained by France.—**Treaty of, 1748.** The Austrian war of succession had arisen from the claims raised by several German princes in opposition to Maria Theresa, who succeeded to the throne of her father, Charles VI., in virtue of the pragmatic sanction. The war lasted from 1740 to 1747, and almost all the powers in Europe were engaged on one side or the other—England and France being, as usual, opponents. The preliminaries were signed in April, 1748, and ratified in October. The pragmatic sanction was renewed, and the *status quo ante bellum* of most of the parties restored. Frederick the Great remained in possession of Silesia, which he had conquered. Austria ceded, besides, to Sardinia, some portions of the Milanese territory; and to Philip, the brother of the king of Spain, Parma, Piacenza, and Guastalla.—**The Congress of Aix-la-Chapelle (1818)** was held for the purpose of settling outstanding questions incident to the wars concluded by the treaties of Vienna. It was attended by the emperors of Austria and Russia and the king of Prussia in person, and by the representatives of the allied powers, Prince Metternich, Lord Castlereagh, the duke of Wellington, Counts Hardenberg, Bernstorff, Nesselrode, and Capo d'Istria. France, being invited to coöperate, sent the duke de Richelieu. The conferences resulted in declarations by the powers confirmatory of the principles of the holy alliance, in a circular to that effect to all the minor courts of Europe, and in freeing France from the allied army, which had remained in that country for nearly three years.

AIX-LES-BAINS, or **Aix** (anc. *Aquæ Allobrogum*, *A. Gratianæ*, or *A. Domitianæ*), a bathing place of S. E. France, in the department of Savoie, 8 m. N. of Chambéry; pop. in 1866, 4,430. The waters are warm, impregnated with sulphur, and have a temperature of from 112° to 117° F. West of it is the lake of Bourget.

AIZANI, or **Azani,** an ancient city of Asia Minor, in Phrygia, mentioned by Strabo, but historically unknown. Its numerous remains at Tchavdyr, 30 m. S. W. of Kutaieh, have been described by several travellers since their discovery by the earl of Ashburnham in 1824. They comprise an ancient temple of Jupiter, a theatre, stadium, and gymnasium. The theatre is in fine preservation. Its greatest diameter was 185 feet, and the auditorium had 15 rows of marble seats. The river Rhyndacus (now Adranas) rises near the town and passes through it, and was spanned by two bridges of white marble, each consisting of five semicircular arches. There are besides many tombs, and Roman coins and inscriptions have been found.—See Hamilton's "Researches in Asia Minor," and Sir C. Fellows's "Asia Minor."

AJACCIO, capital of the island and French department of Corsica, a seaport on the W.

Birthplace of Napoleon Bonaparte.

coast, in lat. 41° 55′ N., lon. 8° 44′ E.; pop. in 1866, 14,558. It has a cathedral, college, museum, library, botanical garden, naval school, picture gallery presented to the town by Cardinal Fesch, and fine promenades. It is much frequented in winter by invalids on account of its genial climate, and is connected by steamers with Marseilles and Nice. The largest ships can lie along its wharves, but the harbor is dangerous during the prevalence of southwest winds. Wine, olive oil, and fruits are the chief articles of trade. It is the birthplace of Napoleon Bonaparte, and the house in which he was born is still in good preservation.

AJALON, or **Aijalon,** a town of ancient Palestine, about 14 m. N. E. of Jerusalem, allotted to the tribe of Dan, but also spoken of as belonging to Ephraim, to Benjamin, and to Judah. It was of little historical importance, and is chiefly known as the place near which, according to the narrative originally contained in the book of Jasher, Joshua commanded the moon to stand still. The modern town is called Yalo.

AJAN, an extensive tract on the E. coast of Africa. It extends from Zanguebar to Cape Guardafui, about 10 degrees of latitude, the southern extremity being near the equator. The S. coast is sandy and barren; the N. is high, especially at Cape d'Orfui (Ras Hafoon), which is a bluff toward the sea, backed by lofty mountains of singular shape. The inhabitants belong to the Eesah or Somauli tribe. There is no river of importance. Ajan was known to the ancients, and called Azania. The inhabitants traded with the Arabs in ivory, tortoise shell, &c., and were under Arab control; and Rhaptum, the capital, was the furthest point to the south known to the Greeks.

AJAX, the name of two Greek chiefs in the Trojan war, distinguished as the greater and the lesser. The greater was the son of Telamon, king of Salamis, and third in direct male descent from Jupiter. He was second only to Achilles in martial prowess, equal to him in strength, but inferior in agility. He led the forces of the Salaminians, in 12 ships. Hector retired before the Telamonian Ajax on more than one occasion in the course of the war. At the death of Achilles, the arms of that hero were allotted to him who had deserved best of the Greeks. But two advanced claims to this honor, the greater Ajax and Ulysses. The former alleged his preëminence as a warrior, the latter as a counsellor. The arms were adjudged to Ulysses. Ajax went mad, committed many excesses, and slew himself. This catastrophe, which is only alluded to by Homer, forms the subject of the tragedy of Sophocles called the "Ajax." In the Odyssey, Ulysses is represented as descending to the infernal regions and there making fraternal overtures to Ajax, who stalks away without reply. He was worshipped in Salamis as its tutelary hero.—The lesser, son of Oïleus, king of the Locrians, whom he led in 40 ships, was remarkable for his swiftness of foot. Having excited the anger of the gods, they raised a storm against his fleet as he was returning home. The Oïlean escaped to a rock, and defied the vengeance of the gods, whereupon Neptune cleft the rock with his trident, and threw Ajax into the sea. His fate is, however, variously told by the poets. According to some, his crime was the violation of Cassandra in the temple of Minerva, at the sack of Troy.

AJMEER, or **Ajmere.** **I.** A non-regulation district of Rajpootana, subject to the lieutenant governor of the Northwest Provinces of Bengal, between lat. 25° 43′ and 26° 42′ N., and lon. 74° 22′ and 75° 33′ E.; area, 2,029 sq. m.; pop. 225,000, mostly Hindoos. The N. W. portion is occupied by mountains connected with the Aravulli range, and contains mines of carbonate of lead, and ores of manganese, copper, and iron. Elsewhere the country is sandy and nearly level. The only river, the Koree, is so strongly impregnated with carbonate of soda that the water is undrinkable. **II.** A city, capital of the above district, situated on the slope of a rocky basin in lat. 26° 29′ N., lon. 74° 43′ E., 220 m. S. W. of Delhi; pop. about 30,000. It is an ancient city, with stone walls and fine gateways, spacious houses, numerous temples, and a ruined palace of Shah Jehan. A large artificial lake supplies it with water. It has an annual fair and pilgrimage in honor of a Mussulman saint called Kwajah, who is supposed on these occasions to work extraordinary miracles. In the 16th century it was the chief place of one of Akbar's richest provinces. The British took it from the Sindia family in 1817.

AKABAH, a fortified village of Arabia, situated in an extensive date grove, or oasis, near the northern extremity of the gulf of Akabah. It is believed to occupy the site of either the Scriptural Elath (the Ælana of the Greeks) or Eziongeber. (See ELATH.)—**Gulf of** (the Ælanitic gulf of the ancients), an inlet of the Red sea, about 12 m. wide, forming its N. E. arm after its bifurcation, lat. 28° N. It extends in a N. E. direction to lat. 29° 32′ N., bounding the mountainous peninsula of Sinai on the E.

AKBAR, or **Akber, Jelal-ed-Deen Mohammed,** the greatest of all the Mogul emperors of Hindostan, born Oct. 14, 1542, died in September, 1605, after reigning half a century. At the time of his accession to the throne of Delhi, on the death of his father Humayun, his dominions embraced but three provinces; in the 40th year of his reign they numbered 15, embracing the whole of Hindostan N. of the Deccan. Akbar was tolerant of all forms of religious belief, and invited Portuguese missionaries from Goa to give him an account of Christianity, which, however, he did not adopt. He diminished the cruel and oppressive taxes laid on his Hindoo subjects, reformed the administration of the revenue, promoted commerce, and improved the roads of the empire. He encouraged learning and literature, and instituted schools in all parts of his empire. His history was written in Persian by his vizier, Abul Fazl, under the title *Akbar Nameh*, partly translated into English ("Ayeen Akbery, or the Institutes of Akber," 3 vols. 4to, Calcutta, 1783-'6, and London, 1800).

AKENSIDE, Mark, an English physician and poet, born in Newcastle-upon-Tyne, Nov. 9, 1721, died in London, June 23, 1770. He was the son of a butcher, and was injured for life when very young by his father's cleaver falling upon him. He was educated for a Presbyterian clergyman, beginning his studies at an academy in Newcastle, and continuing them at the university of Edinburgh. While here he decided to become a physician, and devoted the last two years of his course to medical education. In 1742 he went to Leyden, where he took his degree of M. D. in May, 1744. Just before this he had published in London his poem "The Pleasures of Imagination." Even at an earlier age he had written verses for magazines. The "Pleasures of Imagination" achieved immediate and marked success. It was especially praised by Pope. Akenside practised first at Northampton, but afterward went to London. He was at this time assisted by a friend, Jeremiah Dyson, a lord of the treasury, who gave him an allowance of £300 a year until his practice should support him. He was made a fellow of the college of surgeons and a physician to the queen, but attained no great success in the ordinary walks of his profession. Besides the "Pleasures of Imagination," his greatest work, he wrote several minor poems, and a large number of professional pamphlets and essays.

ÅKERBLAD, Johan David, a Swedish philologist, especially skilled in oriental languages, born in 1760, died in Rome in 1819. When a young man he was made an attaché of the Swedish embassy to Constantinople, where he found an excellent opportunity for the study of Turkish. In 1795 he was made secretary of the embassy, but in 1797 devoted himself to study for a time, and for this visited Göttingen in 1800. In 1802 he was appointed secretary of the embassy at the Hague, and in 1803 chargé d'affaires at Paris. While in Paris he found some Coptic MSS. in the national library, and discovered the key to the unknown character in which they were written. In 1804 he left the Swedish service and went to Rome, where the duchess of Devonshire and others gave him the means of pursuing his studies during the remainder of his life. His works relate chiefly to oriental inscriptions.

AKERMAN, or **Akjerman** (Gr. *Monkastron;* anc. *Tyras*), a town in Bessarabia, on the estuary of the Dniester, near its mouth in the Black sea, and 35 m. S. W. of Odessa; pop. in 1869, 29,373. It is situated at the foot of a rock crowned by a citadel, has a good harbor, and carries on an extensive trade in salt. The interior, in general, has a Turkish aspect. The population, about half Europeans, is greatly mixed. Akerman is the capital of a district of the same name, which has 21 German settlements.

AKERS, Benjamin Paul, an American sculptor, born in Saccarappa, near Portland, Me., July 10, 1825, died in Philadelphia, May 21, 1861. At the age of 18 he went to Portland. After working for some time in a printing office, he was induced to study sculpture. In 1849 he opened a studio in Portland, and during the next two years modelled busts of Henry W. Longfellow and others. In 1851-'2 he visited Italy, and upon returning to Portland modelled a statue of "Benjamin in Egypt," which was exhibited at the New York crystal palace in 1853. In January, 1855, he sailed again for Europe, and during a residence of three years in Rome produced the best of his works, "Una and the Lion," a statue of St. Elizabeth of Hungary (of which three repetitions in marble were executed), the "Dead Pearl Diver," exhibited in the United States, and an ideal head of Milton. The last two works are elaborately described in Hawthorne's "Marble Faun." After returning to America in impaired health, in 1859 he revisited Rome, returned home in 1860, and lived in Portland and Philadelphia.

AKHALTZIKH, Akhalzikh, Achalzik, or **Akhyskha,** a strongly fortified town of Transcaucasian Russia, in the government of Kutais, on an affluent of the Kur, about 95 m. W. of Tiflis; pop. in 1869, 11,616, two thirds Armenians. It has a castle, a fine mosque containing a rich oriental library, several churches, and a synagogue, and is the seat of a Greek archbishopric. It is situated in an elevated valley, in an Armenian district which was ceded by the Porte to Russia in the peace of Adrianople (1829).

AKHISSAR, or **Ek-Hissar** (anc. *Thyatira*), a town of Asia Minor, in the eyalet of Aidin, 58 m. N. E. of Smyrna; pop. about 12,000. It is built on somewhat elevated ground, and contains about 1,000 Turkish, 300 Greek, and 30 Armenian dwellings.

AKHLAT, a town of Asiatic Turkey, in the eyalet of Van, at the base of the Sipan Dagh, on the W. shore of Lake Van; pop. about 5,000. Near it are the magnificent ruins of an ancient residence of the Armenian kings. It is the see of an Armenian bishop.

AKHTYRKA, or **Achtyrka,** a town of Russia, in the government and 60 m. W. N. W. of Kharkov; pop. in 1866, 17,544. It is situated on three lakes, has many manufactures, and ten churches, one of which attracts numerous pilgrims by a miraculous image of the Virgin.

AKIBA BEN JOSEPH, a Jewish rabbi of the early part of the 2d century, one of the principal fathers of the Mishna. A native of Syria, he travelled in Arabia, Gaul, Cyrene, Egypt, and elsewhere, and became the most eminent teacher of his time and people. He favored the insurrection under Bar Cokheba against the Romans, and was executed about 135.

AKKAS. See supplement.

AKMOLINSK, a province of Siberia, organized by a ukase of Oct. 21 (Nov. 2), 1868. It is composed of Koktchetav, Atbassar, and Akmolinsk (three of the five districts into which the land of the Siberian Kirghiz was formerly divided), of five districts and part of a sixth of the Siberian Cossacks, and of the towns of Omsk and Petropavlovsk. Capital, Akmolinsk, 300 m. S. W. of Omsk, founded by the Russians in 1862; pop. in 1867, 4,800. The province remains under the governor general of Western Siberia.

AKRON, a city and the capital of Summit county, Ohio, 36 m. S. of Cleveland, at the junction of the Ohio and Erie and Ohio and Pennsylvania canals, and at the intersection of the Atlantic and Great Western and the Cleveland, Mt. Vernon, and Delaware railways; pop. in 1860, 3,477; in 1870, 10,006. The canals and the Little Cuyahoga river furnish ample water power for numerous mills, factories, and other mechanical establishments. The chief articles of manufacture are flour and woollen goods. There is also a steam engine factory, a blast furnace, a mineral paint mill, a card manufactory, and an extensive stove manufactory. The town is 400 feet above the lake, being the most elevated ground on the line of the canal between Lake Erie and the Ohio river. In the vicinity of the town immense beds of Ohio mineral fire-proof paint are found, and exported to every part of the country. Akron was first settled in 1825.

AK-SHEHR (the White City), a town in the eyalet of Karaman, in Asia Minor, about 5 m. S. of a lake of the same name, and 65 m. N. W. of Konieh; pop. about 15,000. It is the seat of a pasha, and a station of considerable importance on the caravan route between Constantinople and Syria. It carries on an extensive trade, and manufactures carpets, &c. Ak-Shehr is the Philomelium of the ancient geographer Strabo, and near it the German emperor Frederick I. fought a battle with the Seljuks in 1190. It was afterward called Aksiari. Here also the sultan Bajazet I., who was a prisoner in the fortified camp of Tamerlane, died in March, 1403.

AKSU, or **Oksu**, a commercial and manufacturing town of East Turkistan, about 250 m. N. E. of Cashgar; pop. estimated at about 50,000. It is situated in a fertile valley at the terminus of a road leading across the Thian Shan mountains to the Sungarian district of Ili, with which it has an extensive trade. Russian, Tartar, and Chinese caravans here effect their exchanges, and there are famous manufactures of a sort of unglazed cotton cloth called *bias*, elaborate saddlery of deer skin, and jewelled and jasper ornaments. While East Turkistan was under Chinese rule, the city had a Chinese garrison of 2,000 or 3,000 men. The inhabitants are industrious and hospitable. Aksu was the capital of the kings of Cashgar and Yarkand. In 1716 it was nearly destroyed by an earthquake, and at the beginning of the present century it was swept by a freshet in which 3,000 persons perished.

AKYAB, a town of British Burmah, capital of the province of Aracan, situated in lat. 20° 8′ N., lon. 92° 54′ E., on the E. side of the island of Akyab, at the mouth of the Aracan river, 50 m. S. S. W. of the town of Aracan, the former capital; pop. in 1864, 15,512. Its origin dates from 1826. The houses are built chiefly of bamboo; the streets are broad; there are several public buildings and barracks, besides the British government house. It is a free port, opium being the only article subject to duty. The harbor is safe, and the coasting and foreign trade extremely active. It is an important Protestant missionary station.

AL, il, or **ul** (improperly pronounced by those of other nations *el*), the Arabic definite article, and indeed the only article in use in the Arabic language, words indefinitely used standing alone, as *yad*, a hand, *al* or *il yad*, the hand. When this article stands before a lingual or dental (of which there are in Arabic 13, called *shamsi*), the sound of the letter *l* (*lam*) is dropped for the sake of euphony, and the initial dental or lingual takes a double sound; thus, *il shams*, the sun, is pronounced *ish shams*. When the word preceding the article ends in a long vowel, a *wasla* (marked thus ~) is placed over the *a* (*alif*), indicating that it is to be dropped in pronunciation, and the *l* joined to the vowel sound. Thus, Abu il Feda is pronounced Abulfeda.

ALABAMA (Indian, "Here we rest"), one of the southern states of the American Union, situated between lat. 30° 10′ and 35° N., and lon. 84° 53′ and 88° 30′ W., bounded N. by Tennessee, E. by Georgia and Florida, S. by Florida and the gulf of Mexico, and W. by Mississippi; area, 50,722 sq. m. Alabama is divided into 65 counties, viz.: Autauga, Baker, Baldwin, Barbour, Bibb, Blount, Bullock, Butler, Calhoun, Chambers, Cherokee, Choctaw, Clarke, Clay, Cleburne, Coffee, Colbert, Conecuh, Coosa, Covington, Crenshaw, Dale, Dallas, De Kalb, Elmore, Escambia, Etowah, Fayette, Franklin, Geneva, Greene, Hale, Henry, Jackson, Jefferson, Lauderdale, Lawrence, Lee, Limestone, Lowndes, Macon, Madison, Marengo, Marion, Marshall, Mobile, Monroe, Montgomery, Morgan, Perry, Pickens, Pike, Randolph, Russell, Sanford, Shelby, St. Clair, Sumter, Talladega, Tallapoosa, Tuscaloosa,

State Seal of Alabama.

Walker, Washington, Wilcox, and Winston. There are eight cities in the state. Mobile, on the Mobile river, near its mouth in the bay of the same name, is the first in size and commercial importance, having a population in 1870 of 32,034. It is one of the most important ports on the gulf of Mexico, being the natural outlet for S. Alabama and S. E. Mississippi, and ranks next to New Orleans and Savannah in extent of cotton exports. The other cities are Montgomery, the capital, on the Alabama river (pop. 10,588), Selma (6,484), Huntsville (4,907), Eufaula (3,185), Talladega (1,933), Tuscaloosa (1,689), and Tuscumbia (1,214). The more important towns are Greenville (pop. 2,856), Marion (2,646), Florence (2,003), Grantville (1,761), Greensboro (1,760), Union Springs (1,455), La Fayette (1,382), Prattville (1,346), Wetumpka (1,137), Auburn (1,018), and Athens, Jacksonville, and Decatur, with populations less than 1,000. The following table shows the population of the state at each census since its admission into the Union:

Census.	Whites.	Fr. colored.	Slaves.	Total.
1820....	85,451	571	41,879	127,901
1830....	190,406	1,572	117,549	309,527
1840....	335,185	2,039	253,536	590,758
1850....	426,514	2,265	342,844	771,623
1860....	526,271	2,690	435,080	964,201
1870....	521,384	475,510	......	996,894

In 1866 the total population was 946,244, classified as follows: whites, 522,799, of whom 257,337 were males and 265,462 females; colored, 423,445, of whom 206,505 were males and 216,940 females. By the federal census of 1870, Alabama ranks 16th in population among the states. Of the whole number of inhabitants, 987,030 are native and 9,962 foreign born; of the former, 744,146 were born in the state. The gain in the total population during the decade between 1860 and 1870 was 3·40 per cent. There was a gain of 8·62 per cent. in the colored population, but a loss of 0·93 in the white. The effect of emancipation, by adding the two fifths of the slave population formerly excluded from the basis of representation, has been to add 23·40 per cent. to the representative population, of which the total gain has been 26·17 per cent. The whole number of male citizens 21 years of age and upward is 202,182. The number of Indians is 98. In 1860 the number of deaths resulting from unknown causes was 1,608, or 16·67 per cent.; in 1870, 730, or 7·21 per cent.—The Alleghany mountains exhaust themselves in N. E. Alabama, rendering that portion of the state uneven and broken, though the elevation is nowhere very great. The range extends W. with a slight bend to the S., and forms the dividing line between the waters of the Tennessee and the other rivers of Alabama, all of the latter ultimately flowing southward into the gulf of Mexico. From this range the face of the country slopes to the S., and is somewhat uneven as far as the centre of the state, where we find rolling prairies, pine barrens, and very fertile alluvial bottoms. The extreme southern portion of the state is flat, and but slightly elevated above the level of the gulf of Mexico.—Alabama may be divided into five regions, viz.: the timber region, containing 11,000 sq. m.; the cotton region, 11,500; the agricultural and manufacturing region, 8,700; the mineral region, 15,200; and the stock and agricultural region, 4,322. The timber region, bordering on the gulf of Mexico and Florida, extends across the S. portion of the state and 40 m. N. from the Florida line. This section, covered with forests of long leaf yellow pine, yields excellent timber, tar, pitch, and turpentine. The state also produces in abundance different varieties of oak, bald and black cypress, the timber of which is remarkable for its durability, sweet and black gum, poplar, ash, walnut, hickory, locust, chestnut, red and white cedar, dogwood, maple, and elm. Groves of cedar of great height abound in the canebrakes of Marengo and Greene counties. Below the 33d parallel commences the long moss region. This moss, which hangs in festoons from the trees so extensively as to darken the forest, is much used for mattresses. The cotton region joins the timber region on the north, and has a width of about 102 m. on the W. and 60 m. on the E. line of the state. This belt of land, interspersed with large prairies, with an unsurpassed climate and having a stiff black soil, remarkably rich, and from 2 to 20 feet deep, is considered one of the most fertile and healthy agricultural tracts in the South. The land will produce from 50 to 60 bushels of corn or 800 to 900 pounds of seed cotton per acre. Immediately N. of the cotton region lies the agricultural and manufacturing district, extending E. and W. across the state, and having an average breadth of about 35 m. The soil is sandy and poor, but there are numerous streams affording water power. The mineral region occupies the N. E. corner of the state, extending S. W. about 160 m., and has an average width of about 80 m. White marble of remarkable brilliancy, soapstone, flagstones, graphite or plumbago, and granite of good quality are obtained here. In this region are three distinct coal fields, covering an area of 4,000 sq. m., and containing bituminous coal in beds from 1 to 8 feet thick. Near these coal fields are extensive beds of limestone, sandstone, and iron ore producing from 36 to 58 per cent. of metallic iron. Red and other ochres are found; galena and manganese exist in the limestone formations. The stock and agricultural region occupies the N. W. portion of the state; its productions are cotton, corn, grain, grapes, and stock.—Alabama has only about 60 m. of seacoast, extending from Perdido to the W. line of the state, a large portion of the S. boundary being cut off from the gulf by an intervening strip of Florida. Mobile bay, the great outlet to the navigable waters of the state, is the largest and finest on the gulf, being 30 m. in length and from 3 to 18 m. in breadth, with 22 feet of water at the main entrance at low tide; but the channel for 10 m. below Mobile is not more than 8 or 9 feet deep at low tide. Perdido bay is of slight importance. About two thirds of the counties of the state are bounded or intersected by navigable rivers, the principal of which are the Mobile, Alabama, Tombigbee, Chattahoochee, Coosa, and Tennessee. The last named comes in at the N. E. corner of the state, and taking a circular sweep southward goes out at the N. W. corner, and empties into the Ohio at Paducah, Ky. Its continuous navigation is interrupted by Muscle Shoals, near Florence. The great river of the state is the Mobile, formed by the confluence of the Alabama and Tombigbee about 50 m. above Mobile bay, into which it empties at Mobile. The Tombigbee rises in N. E. Mississippi, and is navigable for light-draught steamers to Columbus, about 300 m., and for flat-boats about 125 m. further. The Black Warrior, a branch of the Tombigbee, has its source in N. Alabama, empties near Demopolis, and is navigable for steamers to Tuscaloosa, 285 m. from Mobile. During freshets the Black Warrior at Tuscaloosa rises to a height of 50 feet. The Alabama, which is the eastern branch of the Mobile, is navigable to Montgomery, about 320 m. The Coosa, a branch of the Alabama, is navigable from its mouth to Wetumpka, and from Greensport to Rome, Ga., altogether 160 m., while its course between Wetumpka and Greensport for 180 m. is obstructed by shoals. The Chattahoochee, a large river rising in Georgia and emptying into Appalachicola bay, forms the eastern boundary of Alabama for more than 100 m. It is about 500 m. long, and navigable to the falls at Columbus, Ga., 300 m. above its mouth. Among the smaller rivers are the Conecuh, emptying into the Escambia; the Perdido, emptying into Perdido bay; the Choctawhatchee, emptying into the bay of the same name; and the Cahawba and Tallapoosa, affluents of the Alabama. The attention of the general government and the states interested has been directed to the improvement of the Tennessee and Coosa rivers, and their connection by a canal, in order to form an outlet for the produce of the northwestern and southern states, which will possess advantages over that by the Mississippi river.—Among the natural curiosities are: a natural bridge in Walker county; Bladen and Blount springs, which are the resorts of health and pleasure seekers; and the sulphur springs of Talladega county. The remains of various mounds and roads have been found in different parts of the state, of which the Indians formerly occupying the country furnish no traditions. A stream of water issues from a large fissure in the limestone rocks at Tuscumbia, which is said to discharge 125 hhds. of water per minute, forming a considerable river which empties into the Tennessee. The N. E. corner of the state abounds in wild, grand, and picturesque scenery. The "Suck," a sort of maelstrom in the Tennessee river, and Paint Rock, a very high bluff with figures representing a man's face, are objects of much curiosity.—The climate of Alabama is healthy, except on the low river bottoms, where the prevailing diseases are intermittent, congestive, and bilious fevers; congestive fevers being the most fatal. According to the census of 1870, the rate of mortality was about one death to every 93 inhabitants. Mobile, in its early history, was several times severely ravaged by yellow fever. In the elevated portions of the country the climate is delightful, the heat of summer being materially mitigated by the gulf breezes. During summer the mercury ranges from 104° to 60° F.; in November and the winter months, from 82° to 18°; and in spring, from 93° to 22°. The mean temperature of the state is about 63°, or perhaps something less, and the mercury seldom rises above 95°. July is the hottest month in the year. The fall of rain for 1870 was 48·53 inches. Very little snow falls, and the rivers are never frozen over, though stagnant water is sometimes covered with a thin coating of ice. Fruit trees blossom from the 1st of February to the 1st of March, according to the elevation. In the lower portion of the country there is almost a total lack of good water, while that found in the higher regions is very good. In many parts of the state the inhabitants procure their water from artesian wells, which not unfrequently reach a depth of 1,000 feet, and some of them throw up water in sufficient quantity to turn mills and other machinery.—The soil of the state is various, but mainly productive. In the southern part there are considerable tracts of sandy barrens, but the river bottoms are remarkably fertile. Some portions of the highlands in the north are not worth cultivating, while by far the greater portion is very excellent land, having a productive soil of variable depth, resting on a limestone bed. By its great advantages of soil and climate, Alabama has always held a high rank as an agricultural state. Agriculture forms the principal occupation of the people, manufacturing being carried on only to a limited extent. The chief productions are cotton and Indian corn, though other grains are raised, as are also sugar cane and rice on the bottom lands in the extreme south; and tobacco is grown to a small extent. According to the census of 1870, there are 4,982,340 acres of improved land in the state, and 9,491,270 of unimproved, of which 8,034,700 acres are woodland. The assessed value of real estate is $117,223,043, and of personal property $38,359,552; true value of all real and personal property, $201,855,841; cash value of farms, $67,502,433; of farming implements and machinery, $3,256,101; of all live stock, $26,077,267; of home manufactures, $1,083,720; of slaughtered animals, $4,556,467; estimated value of all farm products, including betterments and additions to stock, $66,532,810; total amount of wages paid to agricultural laborers during the year, including value of board, $11,791,191. The productions were 423,312 bales of cotton, 16,660,488 bushels of Indian corn, 1,049,960 of wheat, 18,594 of rye, 767,732 of oats, 152,456 of peas and beans, 157,446 of Irish and 1,806,264 of sweet potatoes, 222,948 lbs. of rice, 151,557 of tobacco, 370,773 of wool, 3,178,638 of butter, 21,068 of wax, 307,706 of honey, 10,553 tons of hay, and 166,009 gallons of cane and 261,986 of sorghum molasses. There were 78,962 horses, 75,644 mules and asses, 165,663 milch cows, 57,237 working oxen, 248,943 other cattle, 284,607 sheep, and 701,846 swine. The number of manufacturing establishments in the state was 2,231, employing $5,718,607 capital, 291 steam engines with 7,640 horse power, 736 water wheels with 11,098 horse power, and 8,349 hands, receiving $2,211,638 wages annually. The value of materials used in 1870 was $7,643,784, and of products, $13,220,655. Of the manufactories, the most important are 33 for ginning cotton, 10 for the manufacture of cotton goods, 3 for cotton thread and yarn, 20 for the manufacture and working of iron in various forms, 143 for leather, 13 for machinery, 284 lumber mills, and 613 flour and grist mills.—The foreign commerce of Alabama all centres at Mobile, where cotton is the chief article of export, though considerable quantities of sawed lumber and staves are shipped to Cuba, and cedar railroad ties to the northern states. The exports to foreign countries from Mobile for 1870 were $22,422,631, of which $11,829,786 was taken in American, and $10,592,845 in foreign bottoms. The imports for the same period were $1,349,488, of which $161,499 came in American, and $1,187,994 in foreign vessels. The exports of cotton were 188,761 bales (94,462,212 lbs.), valued at $22,376,498. The shipping entering Mobile from foreign ports for 1870 was 40 American vessels, 17,472 tons and 419 men, and 65 foreign vessels, 52,777 tons and 1,320 men. The clearances for foreign ports in the same time were 77 American vessels, 42,663 tons and 889 men, and 51 foreign vessels, 37,075 tons and 976 men. The number of merchant vessels belonging at Mobile in 1870 was 216, with a tonnage of 19,748. During the year 11 vessels, with a total tonnage of 548, were built.—In 1871 there were 1,502¾ miles of railroad —main and side track—completed in Alabama, with an aggregate assessed value of $25,948,052 59, as shown in the adjoined table. The Alabama and Chattanooga railroad connects the latter city with Meridian, Miss., by way of Tuscaloosa, and when completed will afford the most direct communication between New York and New Orleans, through East Tennessee. The Memphis and Charleston road extends through the northern part of the state, and connects the Mississippi river with the Atlantic ocean. The Mobile and Montgomery road extends from Mobile to Montgomery, a distance of 178 miles, connecting at Pollard with the Mobile and Girard road, which is intended to secure direct communication between Columbus, Ga., and Mobile. Running easterly from Montgomery is the Montgomery and Eufaula, which will ultimately form a part of a line to Brunswick on the Georgia seaboard. The Western road, a connecting link of the Mobile, Atlanta, and Augusta line, is completed from West Point via Montgomery to Selma, where by its junction with the Selma and Meridian a continuous line of railroads is formed from Savannah, Ga., to Monroe in Louisiana, from which point connection can be made with the projected Southern Pacific railway. Sixty miles of the Mobile and Ohio road lie in the S. W. part of Alabama; a branch of this road, the Mississippi, Gainesville, and Tuscaloosa, is completed to Gainesville. The Selma, Rome, and Dalton is completed from Dalton, Ga., to Selma, 236 m., and affords a direct outlet to Charleston for the cotton and minerals of central Alabama. The Selma and Gulf line is in process of construction from Selma to Pollard, a distance of 100 m., where connection by railway to Pensacola is made. The Selma, Marion, and Memphis, and the South and North railroads are under construction. The latter connects Montgomery with Decatur, where a junction is made with the Nashville and Decatur road; it will afford an air-line communication between Nashville and the gulf, and serve as an outlet for the mineral stores of central Alabama. An important road is projected from Eufaula to Guntersville, which in the absence of a canal will afford communication between the Coosa and Tennessee rivers. Other projected lines are the Selma and New Orleans, the Mobile and Alabama, Grand Trunk (from Mobile via Marion to Elyton, 240 m.), the Savannah and Memphis, and the Vicksburg and Brunswick. The legislature has empowered the governor, when any railway company incorporated by the state shall have completed and equipped 20 miles of road, to indorse on behalf of the state the first mortgage bonds of the company to the extent of $16,000 per mile for the portion completed, and $16,000 for each section of five miles subsequently completed. These liabilities on Sept. 30, 1871, were as follows:

NAME OF ROAD.	Miles.	Value.
Alabama and Chattanooga	250	$6,120,995 00
Memphis and Charleston	164	2,719,800 00
Mobile and Girard	84	1,076,760 00
Mobile and Ohio	84	1,474,552 00
Mobile and Montgomery	178	2,862,580 00
Montgomery and Eufaula	57	824,289 50
Nashville and Decatur	29	886,435 00
Nashville and Chattanooga	26	480,494 00
Savannah and Memphis	21	268,900 00
Selma and Gulf	81	425,275 00
Selma, Marion, and Memphis	48	771,000 00
Selma and Meridian	83	1,848,981 72
Selma, Rome, and Dalton	177	2,464,812 69
South and North	102	1,625,200 00
Southwestern of Georgia	¾	14,337 68
Western	167	2,588,700 00
Total	1,502¾	$25,948,052 59

NAME CF ROAD.	Mls.	Amount.	
Alabama and Chattanooga.....	295	$4,720,000	
Alabama and Chattanooga, reported excess issued.........	..	580,000	
East Alabama and Cincinnati...	20	320,000	
Mobile and Ala. Grand Trunk.	20	320,000	
Mobile and Montgomery.......	..	2,500,000	
Montgomery and Eufaula......	60	960,000	
Selma and Gulf...............	30	480,000	
Selma, Marion, and Memphis..	45	720,000	
South and North..............	100	2,200,000	
Savannah and Memphis.......	20	320,000	$13,120,000
STATE BONDS FOR RAILROAD PURPOSES.			
Alabama and Chattanooga.....	..	$2,000,000	
Montgomery and Eufaula......	..	800,000	$2,800,000
Total contingent liabilities....	..	....	$15,420,000

—The present constitution of Alabama was adopted in 1868. The legislative power is vested in a general assembly, consisting of a senate and house of representatives. The latter is composed of not more than 100 members, apportioned among the different counties according to population, but each county is entitled to at least one representative. The present number is 100. The number of senators cannot be more than one third nor less than one fourth that of the representatives. The present number is 33. Senators and representatives are elected on the Tuesday after the first Monday in November, the former for four and the latter for two years. One half of the senators are chosen every two years. Persons qualified as electors to vote for members of the general assembly are eligible as representatives; but senators must have attained the age of 27 years and resided for two years in the state. The general assembly meets annually on the third Monday in November, and cannot remain in session longer than 30 days except by a two-thirds vote of each house. A majority of the whole number of members in each house is sufficient to pass a bill over the governor's veto. The executive department consists of a governor, lieutenant governor, secretary of state, auditor, treasurer, and attorney general, who are elected on the same day as the members of the legislature for a term of two years, except the auditor, who is chosen for four years. The judicial power is vested in a supreme court of three justices, with appellate jurisdiction only, except that it may issue writs of injunction, mandamus, habeas corpus, and quo warranto; five courts of chancery and twelve circuit courts, each of which is held by one judge; a probate court for each county; and city courts for Mobile, Montgomery, Selma, and Huntsville; in addition to which the legislature may establish inferior courts of law and equity. The supreme court sits at Montgomery. The judges of the several courts are elected by the people for a term of six years, and may be removed by impeachment or for reasonable cause by the governor on the address of two thirds of the legislature. Judges of the supreme, circuit, and chancery courts cannot hold any other office of profit or trust under the state or United States during their judicial term. The salary of the governor is $4,000, and of the judges of the three higher courts $3,000 each. The right of suffrage is given to all male citizens and those who have declared their intention to become citizens, who have attained the age of 21 years and resided in the state six months next preceding the election, and three months in the county where their votes are offered. Those who during the late war violated the rules of civilized warfare, those disqualified on account of participation in the rebellion, those convicted of crimes punishable by imprisonment in the penitentiary, and those who are idiots or insane, are by the constitution prohibited from voting. The general assembly must provide from time to time for the registration of electors. Every person before registering is required to take an oath to support the constitution and laws of the United States and of the state of Alabama, and to swear that he is not disqualified by law from registering; that he will never countenance or aid in the secession of the state; and that he accepts the civil and political equality of all men. All able-bodied citizens between the ages of 18 and 45 are liable to duty in the militia. The governor is commander-in-chief of the militia, with power to call it forth to execute the laws and preserve the peace, and is required to appoint with the consent of the senate one major general and three brigadier generals of militia. The common schools and other educational institutions of the state are under the management of a board of education, consisting of the superintendent of public instruction, elected by the people for two years, and two members from each of the congressional districts, chosen for four years. The board is required to establish throughout the state, in each township or school district, free schools for all children between the ages of 5 and 21 years. By the law of 1870 it is forbidden to unite in one school white and colored children, except by the unanimous consent of their parents and guardians. The fund appropriated annually by constitutional provision for the support of public schools consists of the proceeds of all lands granted by the United States for school purposes, special appropriations, escheated estates, money paid for exemption from military duty, one fifth of the aggregate annual revenue of the state, and a poll tax of $1.50. The constitution requires a state census to be taken in 1875, and every ten years thereafter, and provides for the establishment of a bureau of industrial resources at Montgomery, under the management of a commissioner, whose duty it shall be to collect statistical information concerning the productive industries of the state, to disseminate among the people knowledge tending to promote their agricultural, mining, and manufacturing interests, and to make an annual report to the governor, to be laid before the general assembly. It also provides for the exemption from sale on execution of personal property of any resident to the value of $1,000, and a homestead not exceeding $2,000 in value. The real and personal property of a woman, whether acquired before or after marriage, is not liable for the debts of her husband, and may be devised and bequeathed by her the same as if she were a *feme sole*. The crimes of treason, murder in the first degree, rape, carnal intercourse with a woman by false representations of being her husband, and arson in the first degree, are punishable with death or imprisonment. Killing in a duel is murder in the second degree, and any one aiding in a duel is made incapable of holding any office under the state. Absolute divorce is granted for habitual drunkenness after marriage, physical incapacity, adultery, abandonment for two years, two years' imprisonment, or extreme cruelty. The legal rate of interest is 8 per cent. Alabama has 7 representatives and 2 senators in the federal congress.—The total taxation not national for 1870 amounted to $2,982,932. The total receipts into the state treasury during the fiscal year were $1,283,587, of which $1,242,886 25 was from taxation and licenses. The total disbursements by the state treasury were $1,366,399, of which $23,843 was for the executive department, $112,860 for legislative expenses, $66,855 for judiciary, $674,410 for educational purposes and schools, and $251,504 for interest. The bonded debt of the state Sept. 30, 1871, was $5,442,300, with interest amounting to $321,106 annually; the total state debt was $8,761,967 87.—Among the public institutions in the state are the penitentiary at Wetumpka, the insane hospital at Tuscaloosa, the asylum for deaf, dumb, and blind, and the freedman's hospital, at Talladega, and an asylum for the blind at Mobile. By the census of 1870 there were 611 blind, 401 deaf and dumb, 555 insane, and 721 idiotic; number of homicides during the year, 100. The number of convicts in the penitentiary in 1869 was 374.—The whole number of children attending school during the year 1870 was 77,139, of whom 31,098 were white males, 30,226 white females, 7,502 colored males, and 8,313 colored females. The number of persons 10 years old and upward unable to read was 349,771; unable to write, 383,012. Of those 21 years old and over who could not write, 17,429 were white males, 31,001 white females, 91,017 colored males, and 98,344 colored females. According to the state auditor's report, the number of public schools in 1869 was 3,225, and of normal schools 16. The total number of children of school age was 387,057, of whom 229,139 were white, and 157,918 colored. The state appropriates about $500,000 annually (1871, $590,605 50) for the support of common schools. By the census of 1860 there were 17 colleges, with 116 teachers and a total endowment of $124,894; 206 academies and private schools, with 400 teachers and 10,778 pupils; and 395 public libraries, with 155,275 volumes. The university of Alabama, founded in 1831, is situated at Tuscaloosa, and is under the control of the state board of education. During the civil war this institution was converted into a military academy. The principal building having been burned in 1865, the legislature in the following year loaned $70,000 to the university for the erection of a new building, which has since been completed. The university owns some valuable lands and has an endowment of $300,000, with an annual interest of $24,000. Since the war it has not been in a prosperous condition. In January, 1871, there were 4 professors and 21 students.—In 1871 there were 71 newspapers and periodicals published in the state, of which 58 were weekly, 2 tri-weekly, 10 daily (which also issued weekly editions), and one semi-monthly. Their aggregate annual circulation was 8,891,432, and their average circulation 1,070.—The leading religious denominations are Methodists and Baptists. The former in 1860 had 777 churches, with accommodations for 212,555 persons, and church property valued at $606,720; the latter 810 churches, worth $495,449, with accommodations for 245,255 persons. There were 202 Presbyterian churches, valued at $368,500, with accommodations for 65,004; 34 Episcopal, valued at $196,050, with seats for 13,840; and 9 Roman Catholic, with 8,000 seats and church property worth $230,450. There are other denominations in the state of less importance as to numbers.—The territory now forming the state of Alabama was originally a part of Georgia. In 1798 the country now included in the states of Alabama and Mississippi was organized as a territory, called Mississippi. At this time Florida, which then belonged to Spain, extended to the French possessions in Louisiana, from lat. 31° to the gulf of Mexico, cutting off Mississippi territory from the gulf coast entirely. During the war with Great Britain in 1812, as a precautionary measure, that part of Florida between the Perdido and Pearl rivers was occupied by United States troops, and finally annexed to Mississippi territory. After the removal of most of the Creek Indians from this territory as the result of a vigorous war in 1813-'14 (see CREEKS), the country was rapidly settled by the whites, and in 1817 the western portion was admitted into the Union as the state of Mississippi, while the eastern part remained as the territory of Alabama till 1819, when it was also admitted as a state. The slave population increased much more rapidly than the free, the proportion of slave to the free population being, according to the state census of 1855, as 239 to 289. The popular vote cast by Alabama at the presidential election of 1860, which resulted in the choice of Abraham Lincoln, was: for Douglas, 13,651; Breckinridge, 48,831; and Bell, 27,875. The state had instructed her delegates to the national convention held at Charleston in April of the same year to withdraw from that body unless the convention should adopt, among others, a resolution affirming "the unqualified right of the people of the slaveholding states to the protection of their property in the states, in the territories, and in the wilderness in which territorial governments are yet unorganized." The convention having refused to declare in favor of this doctrine, the Alabama delegation withdrew. Early in December commissioners were sent by Alabama to the other southern states to urge the withdrawal of these states from the federal government, and their union in a separate confederacy; and on Dec. 24 an election was held for the choice of delegates to a state convention. These delegates were classified as immediate secessionists and coöperationists, the latter being in favor of secession with the coöperation of the other southern states. The convention assembled at Montgomery Jan. 7, 1861, and on the same day communications were received from the representatives of the state in congress, who had held a meeting in Washington, and passed resolutions advising immediate secession. On Jan. 11 the ordinance of secession was adopted by a vote of 61 to 39. The immediate cause of this action was stated in the preamble to the ordinance to be "the election of Abraham Lincoln and Hannibal Hamlin to the offices of president and vice president of the United States of America by a sectional party, avowedly hostile to the domestic institutions and to the peace and security of the people of the state of Alabama, preceded by many and dangerous infractions of the constitution of the United States by many of the states and people of the northern section." The convention held secret sessions and refused to submit its action to the people. These proceedings were followed by the withdrawal on Jan. 21 of the senators and representatives of Alabama from the federal congress, and the election of delegates to the southern congress, which assembled at Montgomery Feb. 4, to organize the southern confederacy. Forts Morgan and Gaines at the entrance to Mobile harbor and Mt. Vernon arsenal were seized by order of the governor, and on the 9th five companies of volunteers were sent to Pensacola, at the request of the governor of Florida, to assist in capturing the forts and other property there belonging to the United States. Subsequently a commissioner was sent to Washington to negotiate with the president for the transfer to the state authorities of the forts, arsenals, custom houses, and other United States property in the state. The president declined to receive this commissioner except as a "distinguished citizen of Alabama." On March 13 the state convention, which had reassembled on the 4th, ratified by a vote of 87 to 6, without submission to the people, the constitution adopted by the confederate congress, and subsequently passed an ordinance transferring to the provisional government the arms and munitions of war acquired from the United States, and also all authority over the forts and arsenals in the state. Laws were enacted by the legislature placing the state upon an efficient war footing and appropriating $500,000 to aid the cause of southern independence. On April 10 the president of the Confederate States made a requisition on the governor for 3,000 troops, and on May 1 the first battalion of the third state regiment left for Virginia. No important military operations occurred within the borders of Alabama during the first years of the war. In February, 1862, immediately after the capture of Fort Henry, Commander Phelps, with three gunboats from the fleet of Commodore Foote, proceeded up the Tennessee river and took possession of Florence at the foot of the Muscle Shoals. This was the first appearance of the national flag in northern Alabama since the beginning of the war, and was received with demonstrations of loyalty by many of the inhabitants who had opposed secession. On April 9 Gen. O. M. Mitchel, who had advanced from Nashville with a division of Gen. Buell's army, took Huntsville by surprise and gained possession of 100 miles of the Memphis and Charleston railroad between Stephenson and Decatur. He advanced westward to Tuscumbia, and thence as far south as Russellville, capturing confederate property without loss of life. The federal forces were soon compelled to abandon the territory south of the Tennessee river, but, having burned the railroad bridges at Decatur and Bridgeport, held all of Alabama north of that river. In the spring of 1864 a naval expedition was fitted out at New Orleans under Rear Admiral Farragut to operate against the fortifications guarding Mobile bay. He defeated the confederate fleet under Admiral Franklin Buchanan, Aug. 6, and, with the coöperation of a land force under Gen. Granger, reduced the forts at the entrance to the harbor —Fort Gaines on the 7th, and Fort Morgan on the 23d. Early in 1865 a combined military and naval expedition against Mobile was organized at New Orleans under Maj. Gen. Canby and Rear Admiral Thatcher; and a force of cavalry under Maj. Gen. J. H. Wilson was ordered to coöperate by a southern march from Eastport, Tenn. Wilson's command, numbering about 15,000, of whom 13,000 were mounted, advanced from Chickasaw March 23, and on April 3 occupied Selma, one of the most important military depots in the southwest. The arsenals, founderies, arms, tools, and military munitions of every kind, together with a large amount of cotton, were destroyed. From Selma Gen. Wilson moved eastward to Georgia, taking possession of Montgomery, the capital, on the 12th of April. On the same day Mobile was taken by Canby and Thatcher. During these operations "the last cannon," says Pollard, "was fired for the Confederacy." On May 4, at Citronelle, Ala., the forces, munitions of war, &c., in the departments of Alabama, Mississippi, and East Louisiana were formally surrendered by Gen. Taylor to Gen. Canby; and on the same day Commodore Farrand surrendered to Rear Admiral Thatcher all the confederate naval forces—12 vessels—then blockaded on the Tombigbee. No official statement of the number and losses of Alabama troops in the war has been made. In an official proclamation, in June, 1865, Provisional Governor Parsons stated the number of troops furnished by the state during the war to be 122,000, and the losses 35,000. Montgomery was the seat of the confederate government until its removal to Richmond on the 20th of May, 1861. Immediately upon the close of the war measures were instituted by the general government for the restoration of Alabama to the Union. For this purpose Lewis E. Parsons was appointed provisional governor June 21, 1865, with instructions to call a convention for the purpose of altering and amending the constitution and laws of the state in conformity with the federal constitution. At the election held Aug. 31 for choice of delegates, those citizens were qualified as electors and delegates who were entitled to vote by the constitution and laws of Alabama in force immediately prior to Jan. 11, 1861, and who had taken the oath of amnesty as set forth in the president's proclamation of May 29, 1865. After assembling on Sept. 10, the convention reordained the civil and criminal laws, except those relating to slaves, as they existed previous to the adoption of the secession ordinance of 1861, declared that ordinance and the state war debt null and void, passed an ordinance against slavery, and provided for an election of state officers and members of congress to be held in November. On the assembling of the legislature, United States senators were chosen, and on Dec. 19 the newly elected governor, assumed executive control. The government thus organized continued in force until supplanted by the military government provided by congress in pursuance of the reconstruction act passed March 2, 1867. By this act Alabama was made subject to the military authority of the United States, and, with Georgia and Florida, constituted the third military district. On April 1, 1867, Major General Pope assumed command of this district with a sufficient military force to protect the rights of all persons, and to preserve the public peace. In accordance with the supplemental act of congress of March 23, 1867, a registration of qualified voters (excluding unpardoned participants in the civil war) was made in August, when 165,813 persons were registered, of whom 61,295 were white and 104,518 colored. An election was held on the first three days of October to decide the question of calling a convention for the purpose of forming a constitution and civil government, and also to choose delegates to the convention; 90,283 votes were cast for the convention and 5,583 against it. The convention assembled in November and framed a constitution, which was submitted to the people in February, 1868, when 70,812 votes were cast for ratification and 1,005 for rejection. The total vote thus cast, being less than the majority of all the registered voters required by the reconstruction law of congress, was not sufficient for ratification. The constitution was, however, by a subsequent act of congress, declared adopted. At the same election state officers and members of congress and of the legislature were chosen. The legislature having assembled and complied with the requirements of the law of congress for the admission into the Union of certain southern states passed June 25, 1868, Alabama became entitled to representation in congress, and on July 14, 1868, the control of affairs passed from the military to the civil authorities. The 15th amendment to the federal constitution was ratified by Alabama Nov. 16, 1870, the 14th amendment having been previously ratified as a condition of representation in congress. See supplement.

ALABAMA, a river of the state of Alabama, formed by the union of the Coosa and Tallapoosa rivers about 10 m. (direct) N. N. E. of Montgomery. It has a westerly course as far as Selma, whence it flows southerly until it joins the Tombigbee about 50 m. above Mobile, to form the Mobile river. It is navigable for vessels of 6 feet draught to Claiborne, 60 m. above the junction. Small steamboats ascend it to Montgomery, 320 m. by the course of the river, the depth of water being from 3 to 5 feet, and in high water about 20 m. further to Wetumpka on the Coosa. The river is very tortuous throughout its course, and on its banks are some of the largest cotton plantations in the South, and much valuable timber. The most important cities and towns on the Alabama are Montgomery, Selma, Cahawba, and Claiborne.

ALABASTER, the name frequently given to two different mineral substances—the one a sulphate of lime, a pure variety of gypsum, and the other a carbonate of lime, of the same chemical composition as most of the marbles. It was used with the same ambiguity by the ancient Greeks and Romans. The resemblance of the two substances is in their delicate white color and fine grain. Each is easily carved and susceptible of a fine polish. They might well in ancient times have passed as varieties of the same substance: the gypsum alabaster being more delicate and softer to cut, and requiring much more care to polish; the calcareous alabaster more firm, and better adapted for the sculpture of larger figures. The latter was frequently obtained from the drippings of the water in limestone caves, which holds carbonate of lime in solution, and deposits it in the form of stalactites and stalagmites. These by a little ingenuity were made to take the forms of the mould the waters dripped upon; or the natural stalagmites of the purest colors were selected, and then wrought into the desired figures.—The name alabaster, now properly limited to the gypseous variety, is derived from the town Alabastron, the site of which is believed to have been between the Red sea and the Nile in Middle Egypt. Here the stone was extensively wrought into boxes and pots for precious ointments and perfumes. A white granular gypsum, pure and in sound blocks, is quarried in Siena and in other places in Tuscany, and manufactured in Florence, Leghorn, Milan, and Volterra, into utensils similar to those used of old, as well as into vases, lamps, clock stands, &c. They are exported from these places in considerable quantity to the United States. The composition of this alabaster is 46·3 per cent. sulphuric acid, 32·9 lime, and 20·8 water. Its hardness is 1·5–2 of the mineralogical scale. It soon tarnishes on exposure to the air, and is easily injured by dust and smoke. Articles made of it should be kept under a glass cover.

ALACHUA, a county of Florida, in the N. part of the peninsula, bounded N. by the Santa Fé river and W. by the Suwanee; area, 1,000 sq. m.; pop. in 1870, 17,328, of whom 12,398 were colored. Orange lake lies partly within its limits. The surface is rolling prairie and the soil is fertile. The productions in 1870 were 168,580 bushels of corn, 8,450 of oats, 18,264 of potatoes, 2,477 bales of cotton, 58 hhds. of sugar, and 22,906 gallons of molasses. The Florida railroad passes through the county. Capital, Gainesville.

ALACOQUE, Marguerite Marie, a French nun, to whom the festival of the Sacred Heart of Jesus owes its origin, born at Lauthecour, diocese of Autun, July 12, 1647, died Oct. 17, 1690. She took the veil in the Visitation convent of Paray-le-Monial, where, according to her biographers, she displayed the gifts of miracles, of prophecy, of revelations, and direct intercourse with God and his angels. She predicted the day of her own death, and experienced ineffable pleasure while engraving the name of Jesus Christ on her bosom with a penknife. She left a treatise on *La dévotion au cœur de Jésus*, which she believed to embody a supernatural communication. The church gives her the title of venerable.

ALA DAGH. I. A lofty mountain chain in Asiatic Turkey, on the northerly side of which the eastern Euphrates takes its rise. Its main portion is situated on the N. edge of the basin of Lake Van, between lat. 39° and 40° N., and lon. 42° and 44° E., and forms part of the watershed between the Caspian sea and the Persian gulf. II. A range in Asia Minor, to the N. W. of Angora, extending between the Ishik Dagh on the N. E. and the valley of the Sakaria on the S. and W.

ALAGOAS, Das, a province of Brazil, on the Atlantic coast, bounded N. and W. by Pernambuco, and separated from Sergipe on the S. by the San Francisco river; area about 11,000 sq. m.; pop. about 300,000, of whom 50,000 are slaves. A considerable portion of its surface is covered with mountains, at the base of which the land is very fertile. The mountains afford large quantities of timber for export, and in the valleys cotton and sugar are cultivated. Tropical fruits of all kinds are grown in abundance, and dragon's blood, mastic, ipecacuanha, copaiba, caoutchouc, &c., are obtained in the woods. The climate is warm and humid, and in the rainy season oppressive. The population is very unequally distributed, the lowlands being most densely peopled. Some of the native tribes still live in the mountains, and subsist by the chase. The principal occupation of the people is agriculture. Porto Calvo is the capital; Macayo or Maceio the chief seaport.—**Alagoas**, the former capital, is situated on a lake opening into the ocean, 150 S. S. W. of Pernambuco; pop. about 12,000. There are several convents and grammar schools.

ALAIN DE LILLE (Lat. *Alanus de Insulis*), a Cistercian scholar, born in 1114, died about 1203. He was called the Universal Doctor, and was one of the most profound savants of the 12th century. He was a philosopher, physicist, theologian, poet, and historian, and was appointed to the bishopric either of Auxerre or of Canterbury, which he soon resigned in order to enter the monastery of Cîteaux. Five countries dispute the honor of his birth, Germany, Scotland, Spain, Sicily, and Flanders. He himself says he came from Lille in Flanders. He wrote, principally in verse, on alchemy, natural philosophy, doctrinal and moral theology, &c.

ALAIS, a city of S. France, department of Gard, on the Gardon, 25 m. N. N. W. of Nîmes; pop. in 1866, 19,964. There are numerous iron furnaces, silk mills, and glass works; and coal is mined in the vicinity to the extent of 1,000,000 tons annually. It is a great depot of the raw silk of S. France.

ALAJUELA, a city of Costa Rica, Central America, 14 m. N. W. of San José, the capital; pop., including suburbs, about 10,000. It is a place of considerable commercial importance, and is connected with the port of Puntas Arenas, on the gulf of Nicoya, by an excellent mule road.

ALAMAN, Lucas, a Mexican statesman, born in the latter part of the 18th century, died June 2, 1855. He was a member of the cabinet under Bustamente in 1829, and in 1853 Santa Anna appointed him minister for foreign affairs. He induced Santa Anna to decree the abolition of the liberty of the press, with severe punishments for the infraction of the new law on this subject, the restoration of the confiscated property of the Jesuits, a regular recruiting system, and a reorganization in the army. By his influence onerous taxes were imposed upon the impoverished population, and a law was passed for cashiering all Mexican officers who had voluntarily surrendered to the American government. He was the author of *Historia de Méjico* (5 vols., Mexico, 1849–'52).

ALAMANCE, a N. county of North Carolina; area, 500 sq. m.; pop. in 1870, 11,874, of whom 3,640 were colored. The river Haw, a branch of the Cape Fear, runs through the centre of the county, and through the W. part Alamance creek flows into the Haw. The soil is fertile and the surface undulating. The productions in 1870 were 86,284 bushels of wheat, 177,772 of corn, 66,274 of oats, and 155,570 lbs. of tobacco. In 1867 there were 26 churches, 4 academies, 5 cotton factories, and 5 flour mills. The North Carolina railroad traverses the county E. and W. Capital, Graham.

ALAMANNI, or **Alemanni, Luigi,** an Italian poet, born at Florence in 1495, died at Amboise, France, in 1556. His father was devoted to the party of the Medici. Suspected of conspiring against the life of Cardinal Julius, who was governing Florence in the name of the pope, he fled first to Venice, and, after the accession of the cardinal to the papal throne under the name of Clement VII., to France. Repeated attempts to reëstablish himself in his native city failed. Francis I., who had a high opinion of him, finally took him into his service, and, after the peace of Crespy in 1544, appointed him ambassador at the court of Charles V. He retained the good will of the successor of Francis, Henry II. He left many poems, satires, fables, and other light literature. His principal work is his didactic poem, *La Coltivazione* (Paris, 1546).

ALAMEDA, a W. county of California, on San Francisco bay; area, 820 sq. m.; pop. in 1870, 24,237, of whom 1,939 were Chinese. The San Francisco and Alameda, and the San José and Stockton railroads run through the county. Gold and some other minerals are found in small quantities. The principal productions in 1870 were 854,888 bushels of wheat, 668,975 of barley, 69,080 of oats, 114,053 of potatoes, 138,975 lbs. of wool, 198,910 of butter, and 23,464 tons of hay. There were 6 newspapers published, of which 3 were dailies. The scenery of this county is very attractive. The warm springs, in a little valley among the foot hills of the Coast range, are much frequented for their medicinal properties, the water containing sulphur, lime, magnesia, and iron, in various proportions. Capital, San Leandro.

ALAMO, a fort in Bexar county, Texas, near San Antonio, on the left bank of the San Antonio river, celebrated in the Texan war for independence. It was an oblong structure, about an acre in extent, surrounded by a wall 8 or 10 feet high and 3 feet thick. Gen. Sam Houston had caused San Antonio to be dismantled, upon which Santa Anna with a large detachment of his army invested Fort Alamo, Feb. 23, 1836. The Texans, consisting only of 140 men, commanded by Col. William Barrett Travis, retired into the fort, while the Mexicans, 4,000 strong, after taking possession of the town, erected batteries on both sides of the river, and bombarded the fort without cessation for 24 hours. During this time over 200 shells were discharged into the fort, yet not a man was injured, while the Texan sharpshooters, standing upon the ramparts, were able to pick off man after man of the enemy. Several assaults were now made, but in every instance the Mexicans were repulsed with loss. Col. Travis repeatedly sent couriers to San Felipe asking for assistance, but only 32 men succeeded in forcing their way through the Mexican lines and reaching the garrison. By March 3 scarcity of provisions, combined with constant watching, had undermined the health of the men, without, however, affecting their spirits. Before daybreak on the 6th a combined attack was made by the whole Mexican force. Twice assaulting, they were twice driven back, with severe loss. The Texans, unable to load in the hand-to-hand fight which now ensued, clubbed their rifles and fought with desperation until but six of their band remained alive. These, including Col. Crockett, surrendered to Castrillon, under promise of protection; but being taken before Santa Anna, they were by his orders instantly cut to pieces. Col. Crockett fell stabbed by a dozen swords. Col. Bowie, ill in bed, was then shot, after having killed several of his assailants. Major Evans was shot while in the act of firing the powder magazine. The bodies of the slain were collected in the centre of the Alamo, and after being horribly mutilated (in which act, it is said, Santa Anna and his generals joined), they were burned. But three persons, a woman, a child, and a servant, were spared. The Mexican loss was 1,600. The massacre of the Alamo was followed by the battle of San Jacinto, the defeat of the whole Mexican army, and the capture of Santa Anna himself, with his best generals. At this battle the Texans, with the war cry of "Remember the Alamo!" carried all before them.

ALAMOS, Real de los (Camp of the Poplars), a town in the southern part of Sonora, Mexico, 175 m. S. W. of Chihuahua, and about 45 m. E. of the gulf of California; pop. about 11,000. The houses are built of stone or brick, overlaid with stucco, the streets are tolerably well paved, and the place is celebrated for the beauty of its avenues (*alamedas*). It was severely injured by a storm in November, 1868. The district of Alamos, extending to the gulf of California, is famous for its rich copper and silver mines, and for its salubrious climate, its average height being several hundred feet above the gulf. The silver mines in the vicinity of the town employ about 4,000 persons.

ALAN, Allen, or **Allyn, William,** an English theologian, born in Lancashire in 1532, died in Rome, Oct. 6, 1594. Being a zealous Catholic, he left England soon after the accession of Elizabeth, and settled in Flanders, where he published several works in defence of the old faith. In 1568 he founded the famous ecclesiastical college of Douay for the education of English youth, Pope Gregory XIII. assisting him with a subsidy. Ten years later the magistrates ordered it to be closed, and Alan removed the establishment to Rheims, but it was restored to Douay in 1593. Dr. Alan was concerned with other professors of this college in making the English translation of the Bible commonly known as the Douay version. He was deeply implicated in the Catholic schemes for dethroning Elizabeth, and when the Spanish armada was fitted out, Philip II. caused the pope to give him a cardinal's hat, the design being that Alan should accompany the expedition as papal legate. Instead of embarking in person, Cardinal Alan supplied the fleet with copies of a pamphlet against Elizabeth, entitled an "Admonition to the Nobility and People of England." He was made archbishop of Mechlin in 1591, but at the desire of Pope Sixtus V. he continued to reside in Rome.

ALAND ISLANDS, a group of about 200 rocky islets, of which 80 are inhabited, situated at the entrance of the Bothnian gulf, between lat. 59° 55′ and 60° 32″ N., and lon. 19° and 21° E. They belong to Russia, having been ceded by Sweden in 1809, and form a part of the government of Abo-Björneborg in Finland. The inhabitants, about 16,000, are Swedes, and are excellent sailors and fishermen. They keep great numbers of cattle, and export cheese, butter, and hides; they also manufacture cloth for home use and for sails. The group takes its name from the largest island; area, 28 sq. m.; pop. 10,000. It has a good harbor on the W. side. Foremost among the former fortifications was the fort of Bomarsund, near the S. E. extremity of the main island, which was captured in 1854 by the allied fleets of England and France during their war against Russia, and blown up on their departure. By the treaty of Paris of 1856 Russia is prohibited from fortifying the islands or having there any military or naval station.

ALANI, a tribe of Scythians, frequently appearing in connection with the various German invaders of the Roman world during the great migration of the nations of the north. Their origin is uncertain, though they seem to have been of Finnish stock. They originally dwelt about the eastern part of the Caucasian mountains, whence they extended toward the Don, and also made inroads into Armenia and Asia Minor. Vologeses, king of the Parthians, invoked against them the aid of the emperor Vespasian. Arrian the historian, lieutenant of the emperor Hadrian in Cappadocia, successfully warred against them. They are mentioned as excellent horsemen and marksmen with the bow. In the time of Aurelian they united with the Goths and invaded Asia Minor, but were expelled about 280 by the emperor Probus. In the later years of the 4th century they were routed by the Huns, and, joining their conquerors, drove out the Goths from the region between the Don and the Danube, and shared in the great movement of the northern tribes toward the southwest of Europe. Conjointly with the Suevi and the Vandals, in 406, they invaded and devastated Gaul. A body of the Alani who remained south of the Loire appeared in 451 as allies of Aëtius against Attila. Another body of them marched in 409 into Spain, but were there overpowered by the Visigoths, and driven into Lusitania, where their name disappeared. Still other Alani invaded northern Italy half a century later, and were almost totally destroyed. The annals of the Byzantine empire also mention the Alani as devastating both the regions on the Danube and in the Caucasus.

AL-ARAF, in Mohammedan theology, the wall of separation between heaven and hell, corresponding somewhat to the purgatory of the Latin church. Sitting astride of this wall are those whose good and evil deeds so exactly balance each other that they deserve neither heaven nor hell, and those who have gone to war without their parents' consent and fallen in battle. These last are martyrs, and are therefore preserved from hell, but, inasmuch as they have disobeyed their parents' commands, they are not deemed worthy of heaven.

ALARCON, Hernando de, a Spanish navigator of the 16th century, to whom we owe the first certain knowledge concerning the configuration of the peninsula of California. This had previously been held to be an island. Alarcon set sail in the service of the Spanish court May 9, 1540. On the W. coast of America he expected to make a junction with the expedition commanded by Coronado; but the two commanders missed each other. Alarcon left an inscription on a tree at the place where they should have met, which was discovered by a third Spanish navigator. The inscription was: "Alarcon came to this point; at the foot of the tree are buried letters." These letters conveyed the intelligence that Alarcon, after having tarried there for some time, had returned to New Spain; that the supposed sea was a gulf; that he had sailed round the Marquis island; and that California was not an island, but a point of land jutting into the Pacific. Alarcon returned to New Spain in 1541, and there drew up his maps and observations. His discoveries and those of Fernando de Ulloa were applied to such good use, that an eminent geographer has said the map of California made in 1541 differs hardly at all from that constructed in our own day.

ALARCON, or **Alarcon y Mendoza, Juan Ruiz de**, a Spanish dramatist, born in Mexico of a noble Spanish family, died in Spain in 1639. In 1628 he published the first volume of his dramas, on the title page of which he styles himself prolocutor (*relator*) of the royal council for the Indies. To the eight plays contained in this volume he added twelve more in 1635. His best known comedy is *La verdad sospechosa*, which served as a model for Corneille's *Menteur*. Another of his comedies, *Las paredes oyen*, is still popular on the Spanish stage. A new edition of his plays has been published by Hartzenbusch (Madrid, 1848–'52).

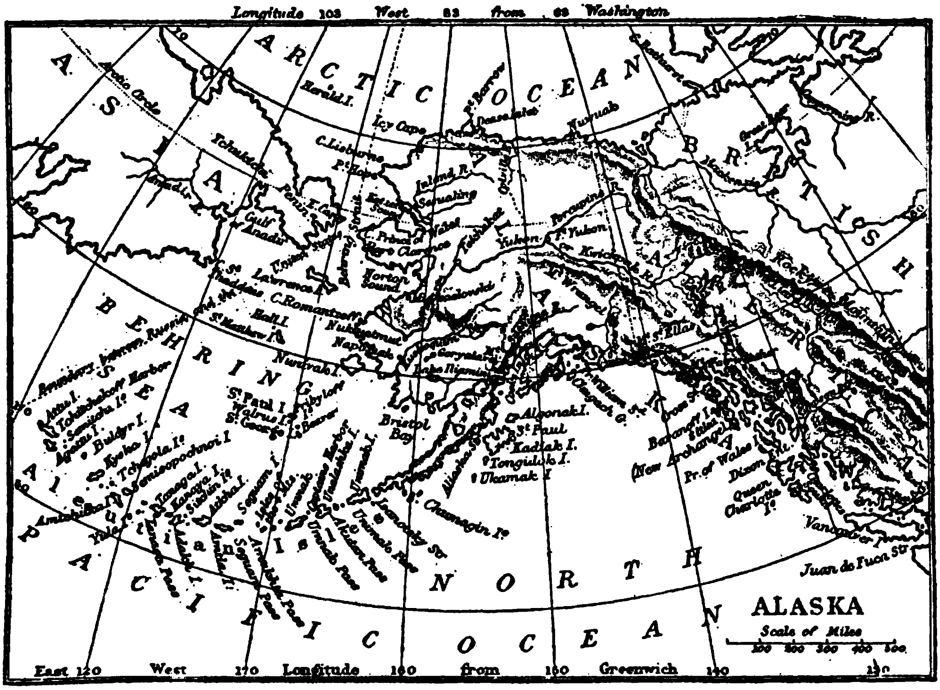
ALARIC I. King of the Visigoths, born about 376, died in 410. Previous to his reign the Goths north of the Danube (mostly Arians), being pressed by the Huns, claimed the protection of the Roman emperors, who allowed them to cross the Danube and establish themselves on its southern side in Mœsia (modern Bulgaria) as paid allies of the empire. On the death of Theodosius (395), who divided the empire between his two sons, Alaric, profiting by the weakness resulting from the division, invaded Thrace, Macedonia, Thessaly, and central Greece, without meeting resistance on the part of Rufinus, the lieutenant of the emperor Arcadius. Athens was obliged to pay a ransom. Alaric entered the Peloponnesus, where he was encountered in Elis by a powerful army under Stilicho, the lieutenant of Honorius, emperor of the West. Stilicho tried to surround the Goths on the banks of the Peneus, but Alaric broke through his army, escaped with his plunder and prisoners to Illyricum, concluded peace with Arcadius, and was made by him the commander of the eastern division of that country in 396. From Illyricum, in 402, Alaric invaded Italy. Honorius shut himself up in Ravenna, while Alaric, marching through northern Italy toward Gaul, was met and defeated by Stilicho near Pollentia on the Tanaro (403) and obliged to retreat. He sustained a second defeat in the same year near Verona, after which he returned to Illyricum, and concluded a treaty with Honorius, undertaking to invade the eastern empire and join his army with that of Stilicho in Epirus. This project being afterward abandoned by Honorius, Alaric claimed a compensation for the cost of his armaments and march, and was promised 4,000 pounds of gold. Stilicho, who made the promise in the name of the emperor, being beheaded in 408, and the promise broken, Alaric invaded Italy, invested Rome, and received as ransom from the city 5,000 pounds of gold and 30,000 pounds of silver. Further negotiations for peace having proved unsuccessful, Alaric for the second time laid siege to Rome. Hunger obliged the city to conclude an arrangement, and in compliance with the will of the conqueror the senate elected as emperor the Roman general Attalus. Shortly afterward, being dissatisfied with the incapacity of his nominee, Alaric ordered him to resign. Renewed negotiations with Honorius were unsuccessful, pending which Alaric's army was treacherously attacked near Ravenna, and he undertook the siege of Rome for the third time. On August 24, 410, he took the city by assault, and it was plundered by the Goths for three days. After remaining there six days, Alaric marched out, intending to make the conquest of Sicily, but died soon after in Cosenza. The Goths, it is related, turned from its bed the stream of the Busento, to bury their chief there, with all his treasures; and all the prisoners who performed the work of digging were killed, that the Romans might never be able to find the place where the remains of the king were deposited. **II.** King of the Visigoths, succeeded his father Euric in 484, died in 507. His dominions extended S. from the Loire and Rhône over Hispania Tarraconensis and Bætica, thus covering the S. W. third of the present territory of France and nearly the whole of Spain. He was peaceful and tolerant, and, though an Arian in religion, granted many privileges to the orthodox Catholics. Clovis, king of the Franks, made religion a pretext for invading Gothia, and defeated Alaric at Vouglé, near Poitiers. Alaric fled, but was overtaken and killed. Theodoric, king of Italy, the father-in-law of the slain monarch, became regent during the minority of Alaric's son Amalaric, compelled the Franks to give up their conquests, and put down a rebellion of the supporters of Alaric's bastard son Gesalic.

ALARM, an instrument to give notice by sound. In its most ordinary form it consists of a bell and a hammer, combined with an escapement that lets it free at the proper time, when a descending weight or a spring makes it strike the bell.—Burglar alarms are of various forms. Some consist in an arrangement for firing a pistol, and are connected either with the lock or with the door. Some of them are so arranged as to shoot the thief at the same time that they wake up the inmates. An alarm for this purpose may always be put up at a moment's notice, by stretching a string across the hall, one end attached to the knob of a door and the other to the trigger of a pistol, or to some glass or brass vessel placed on the edge of a table or at the top of a flight of stairs, which will tumble down with a noise the moment the string is pulled by any one opening the door or crossing the hall. An alarm is easily made by arranging the wires in the circuit of a galvanic battery in such manner that the circuit may be broken when a door or window is opened; the falling of an electro-magnet which was supported by the electrical current then gives the motive power for ringing a bell or other sound-producing instrument.—An alarm clock is a clock for sleeping rooms, provided with an alarm that may be wound up to strike at any appointed time, and so awake the sleeper. It consists of an ordinary clock with an alarm attached, which requires to be wound up at a separate keyhole from that which winds the clock, and after each alarm requires rewinding to give it impulse for another. The alarm is commonly set, to go off at the required hour, by means of a disk which lies under the hour hand of the clock, revolving upon the same axis and with that hand. The disk has the 12 hours printed in the same order and position as on the clock face, and when this disk is brought into the same position as the clock face, that is, having the 12 on the disk at its highest point, the clock then by mechanism sets off the alarm. In order to cause the alarm to sound at 4 o'clock, for instance, the number 4 on the disk is brought under the hour hand, which latter carries the disk forward till 4 o'clock, and at this moment the 12 on the disk will be at its highest point and the alarm is set off.—The fire-damp alarm is an important invention, due to M. Chuart from France, and liberally given by him to the public. It consists of a small ball of glass or of brass suspended at the end of a lever, and containing a chemical solution highly sensitive to the gas constituting fire damp. Long before the atmosphere has become sufficiently vitiated to be dangerous to life, or to be capable of exploding, the chemical action in the ball has altered its weight, and thus caused the lever to move and let go an escapement which sounds an alarm.—An alarm whistle is a steam whistle set on a boiler to give notice when the water falls below its proper level. For this purpose the whistle-cock is connected by a lever with a float, and opens when this float goes below a certain level. The steam rushing through the whistle sounds the alarm.

ALASCO, John. See Laski.

ALA-SHEHR, a city of Turkey, in Asia Minor, in the eyalet of Aidin, at the N. E. base of the Boz Dagh (the ancient Mt. Tmolus), 75 m. E. by S. of Smyrna; pop. about 13,000, of whom 3,000 are Greeks. It is built on the site of ancient Philadelphia, is surrounded by a wall, and contains many ruins, including a large number of Christian churches. It is situated on the caravan route from Smyrna to the interior, and has a thriving trade.

ALASKA, a territory belonging to the United States, formerly known as Russian America. It comprises all that portion of the North American continent lying W. of the 141st parallel of W. longitude, together with a narrow strip of land between the Pacific ocean and the British dominions, separated from the latter by a line drawn as follows: beginning at the southernmost point of Prince of Wales island, in lat. 54° 40′ N., running thence N. along Portland channel to the point of the mainland where it strikes lat. 56° N., and from this point along the summits of the mountain range parallel to the coast, except where the distance of such summits from the ocean exceeds 10 marine leagues, to its intersection with the 141st meridian. Wherever the peaks are situated further inland than the distance specified, the line is drawn, parallel to the winding of the coast, at that distance from it. The territory also includes all the islands near the coast, and the whole of the Aleutian archipelago except Behring island and Copper island on the coast of Kamtchatka. In the dialect of the natives first encountered by the Russian explorers, the peninsula now known as Aliaska was called Al-áy-es-ka, the name having become changed through Alaksa and Alashka to its present form, from which last is derived the general territorial designation Alaska, which Dall asserts to be an English corruption never used by the Russians. The area of Alaska, including the islands, is 580,107 sq. m.; pop. in 1870, 29,097, of whom 26,843 were natives of the territory, 1,421 were half-breeds, 483 were Russians, and 350 were natives of the United States and foreigners not Russians. There are not more than 1,300 completely civilized inhabitants.—Sitka, or New Archangel, the capital of the territory and its only considerable town, is situated on a small but commodious harbor on Baranov island, in lat. 57° 3′ N., lon. 135° 17′ W. It was long the headquarters of the Russian-American fur company,



though the natural centre of the fur trade is the island of Kadiak, S. of the Aliaska peninsula. At the time of the transfer of the territory to the United States in 1867, Sitka, although founded in the last century, was little better than a collection of log huts, about 100 in number, with a few superior buildings occupied by government officers. St. Paul, the principal settlement on Kadiak island, is the main depot of the seal fisheries, and is surrounded by the finest farming land in the territory. Next in importance as a settlement is Captain's Harbor, on the island of Unalashka, where is found the best anchorage in the Aleutian group. The remaining civilized places in Alaska consist for the most part of small trading posts scattered throughout the country, the principal of them being Fort Yukon, approximately in lat. 66° N., the most northerly station of the Hudson Bay company, which for some years paid the Russian-American fur company a royalty for the privilege of thus trading in their territory. Michaelovski, a station of the Russian company on Norton sound, in lat. 63° 28′ N., and lon. 161° 44′ W., is of considerable importance as affording the best harbor on the coast from which to forward goods into the Yukon valley.—The interior of Alaska has been but slightly explored, and our knowledge of the country is confined mainly to the islands, the coasts, and a few of the larger rivers. The entire coast line of the territory, without taking into account the smaller indentations, measures about 4,000 m. in length, and is bordered by three seas: the Arctic ocean on the N., Behring sea on the W., and the North Pacific on the S. The coast formation along the North Pacific differs entirely from that N. of the Aliaska peninsula. Point Barrow, a long arm of low sandy land projecting into the Arctic ocean, forms the most northerly cape in the territory. Between this point and Behring strait, the only considerable indentation of the coast is Kotzebue sound, with a maximum depth of 14 fathoms, and the shore is low and swampy except at Cape Lisburne, where the limestone rock rises to the height of 850 feet above the sea. Cape Prince of Wales, the E. boundary of Behring strait, is the most western land on the American continent, being situated in lat. 65° 33′ N., lon. 167° 59′ W., only 45 m. from East cape, the nearest part of Asia. It is a rocky and precipitous promontory. The nearest harbor is Port Clarence, a short distance S., where there is a safe anchorage in 10 fathoms of water, with a bottom of soft mud. Below this inlet the country becomes low and rolling, and is not very accessible from the ocean, even in the larger bays, on account of the shoals formed of alluvium brought down by the rivers, which is retained in Behring sea by the rocky barrier of the Aliaska peninsula. Norton sound is so shallow that vessels have been known to run aground there at the distance of a mile from the shore; but it affords a few harbors, as also does Bristol bay, which opens into the region N. of the same rugged and barren peninsula from which the name of the territory is derived. Stretching westward toward Kamtchatka lie the Aleutian islands, so called from the name Aleuts applied to their inhabitants by the Russians. Unimak is the largest of these, and Unalashka of the greatest commercial importance. The celebrated fur seal group, named after Pribyloff, its discoverer, is situated in Behring sea, lat. 57° N., lon. 169° 30′ W., and consists of four small islands called respectively Walrus, Beaver, St. George, and St. Paul. Below Aliaska the coast becomes mountainous, with deep soundings close in shore. Between lon. 151° and 158° W. lies the Kadiak archipelago, including the large island of that name. Cook's inlet and Prince William sound, or Chugach gulf, are the principal arms of the sea on the North Pacific coast of the territory, until we reach the narrow strip of mainland S. of Mt. St. Elias, which is protected from the sea by the 1,100 islands of the Alexander archipelago, situated between Cross sound and Dixon's entrance. The almost innumerable channels between the islands of this vast series afford the finest inland navigation. Prince of Wales island is the largest member of the group, which also contains Baranov island, the site of Sitka.—The great river of Alaska is the Yukon, or Kwickpak, as it has erroneously been called by the Russians, from the name of one of its mouths. It rises in British Columbia, enters Alaska near the Arctic circle, and flows, with a general S. W. trend, across the entire width of the territory into Behring sea. Its length is more than 1,800 m., and it is over a mile broad at a point 600 m. above its delta. Its current varies in rapidity from 3 to 7 m. per hour, and in summer the river is navigable for light-draught steamers throughout three fourths of its length. Next to the Yukon in size is the Kuskoquim, which also flows into Behring sea, somewhat further S. It has been explored by the Russians some 600 m. above its mouth, and is a very crooked and moderately rapid stream, navigable for a considerable distance. The principal rivers of Alaska which flow into the North Pacific ocean are: the Copper river, which reaches the coast in lat. 60° N., lon. 145° W., and about which very little is known; the Chilkaht, a rapid stream, which enters Lynn channel W. of Cross sound, and the head waters of which approach so close to a tributary of the Yukon that a short portage affords the Indians easy communication between the two rivers; and, still further S., the Stikine or Francis river, forming the gateway to the gold region of British Columbia. Lakes are said to be numerous in the interior of the country.—Alaska is emphatically a country of volcanoes, there being no fewer than 61 volcanic peaks already known in the territory, though but 10 of these are in activity at present. The peninsula of Aliaska, and the Aleutian islands, which really constitute a continuation of it, are of volcanic origin, and the same is true of the islands along the coast of Behring sea. So far as known, all the mountains in the country of any considerable height are situated below lat. 65° N. There are three important mountain chains: the Coast or St. Elias range, the Rocky mountains, and the Alaskan range. In the Coast range, on the North Pacific, are the loftiest peaks and principal volcanoes. Of these Mt. St. Elias is the highest; its elevation is variously stated at from 16,000 to 17,850 feet, the latter estimate making it the highest mountain in North America. The summit of Mt. Fairweather, in the same chain, is 14,500 feet above the sea level. E. of the Yukon, the Rocky mountains extend along or near the 64th parallel to the basin of the Mackenzie river. The Alaskan range in the S. W. part of the territory is merely an offshoot of the Rocky mountains. There is a long line of low hills near the Arctic coast.—The climate of Alaska is by no means so inhospitable as that of corresponding latitudes on the eastern coast of North America. In regard both to climate and agriculture, the territory is naturally divisible into three regions: the Yukon district, comprising all the country N. of the Alaskan mountains; the Aleutian district, comprising the islands of that name and the peninsula; and the Sitka district, comprising the remainder of the territory. In the Yukon district the mean annual temperature is about 25° F., and the ground remains frozen to within two or three feet of the surface throughout the summer. The amount of rainfall is not accurately known. In winter the ice on the Yukon averages five feet in thickness, and where there is sufficient water it has been known to freeze to a depth of nine feet. The summer is short, dry, and hot. May, June, and a part of July constitute the pleasant season; then the rainy weather begins, and lasts till October. The lowest temperature ever recorded in this region was —70° F. The climate of the Aleutian district is warmer, the mean annual temperature being from 36° to 40° F. In a series of observations made at Unalashka, extending over five years, the greatest cold experienced during that time was found to be the zero of Fahrenheit, while the highest temperature was 77°. The average annual rainfall is about 40 inches, distributed among 150 rainy days in each year. January, February, and June are the pleasantest months. A still warmer and moister climate is characteristic of the Sitka district. The town of Sitka is the rainiest place in the world outside of the tropics. From 60 to 90 inches of rain fall annually, and the number of rainy days in each year varies from a mininum of 190 to a maxinum of 285. The mean annual temperature is 44·07°; but the average temperature in winter is proportionately much higher than in summer, being only a little below the freezing point; while the excessive rains in summer make that season unduly cold. Ice fit for consumption scarcely ever forms at Sitka.—The interior of Alaska is well wooded. On the Pacific coast, dense forests of the Sitka spruce or white pine (*abies Sitkensis*) clothe the mountain sides both of the islands and the mainland, down to the very water's edge, producing timber of great size and unsurpassed quality. In the same region grows the yellow cedar (*C. Nutkatensis*), of great value for boat-building. Hemlock and the balsam fir are also found here. The Aleutian islands are wholly destitute of trees, there being no vegetation on them larger than a shrub. In the Yukon region, the wooded district recedes from the coast, but timber is abundant in the interior, the finest tree which occurs there being the valuable white spruce (*abies alba*). The birch (*betula glandulosa*) is also found, and furnishes the only hard wood in this part of the country. Alders, poplars, and several varieties of willow fringe the banks of all the larger streams.—The agricultural resources of Alaska are practically confined to the Aleutian and Sitka districts. The abundant growth of rich perennial grasses in the valley of the Yukon affords excellent fodder for cattle, but no grain has ever been raised there, and the only vegetables which have succeeded are radishes, turnips, and lettuce. The most fertile land is found at Cook's inlet, on Kadiak island, and among the Aleutians, where good oats, barley, and root crops can be raised without much difficulty. Whether the potato can ever be cultivated successfully in Alaska is doubtful. In the most favored farming districts the agricultural production can scarcely ever exceed the local demand.—Alaskan geology has been but imperfectly studied, and only a few of the leading facts are known. According to William H. Dall, the director of the scientific corps which explored the proposed route for the Russo-American telegraph line in 1866, the whole of the peninsular portion of Alaska W. of lon. 150° is gradually rising. Along the Pacific coast glaciers, some of them remarkable for their extent and grandeur, fill the principal mountain gorges, and terminate at the sea in magnificent masses of overhanging ice. The fact that these glaciers are gradually decreasing in size from year to year leads to the inference that the rigor of the climate is slowly mitigating. Hot and mineral springs are found near Sitka, on the Aleutian islands and the neighboring coast, and in other parts of the territory. In the Alexander archipelago fossils of the cretaceous period have been found, but the extent of the formation has not been ascertained. Clay slates and conglomerate occur near Sitka. Crystalline white marble of fine quality has been discovered on Lynn channel and in other portions of the archipelago. Thence northward to Mt. St. Elias granite and metamorphic rocks skirt the coast. In the Aleutian islands the tertiary formation is of considerable extent, and contains coal, lignite, and amber. The best deposit of tertiary coal, so far as known, is on Cook's inlet, where it occurs in two parallel layers, with an estimated thickness of from 18 inches to 7 feet. Gold and silver are found in Alaska in small quantities; and copper is frequently brought to the settlements by Indians dwelling on the Copper river, who sedulously conceal the locality of its origin. Cinnabar and iron have been found in very limited quantities. Of sulphur the volcanic districts of the territory afford an abundant supply.—The fossils found in Alaska show that it was once the home of the elephant, the buffalo, and the horse. Bears are now the largest animals native to the country. Of these, the polar or white bear (*ursus maritimus*) is met with on the Arctic coast; the black bear (*U. Americanus*) in the woody districts of the Yukon; and the barren-ground bear (*U. Richardsonii*) in the far northeast. The grisly bear (*U. horribilis*) is also occasionally encountered. Of the other non-marine fur-bearing animals the principal are the fox, the beaver, the marten, the otter, the mink, the lynx, and the wolverene. On the coasts are found the fur seal, the main source of revenue in the territory; the sea lion, closely allied to the former; the sea otter, an animal of solitary habits living almost exclusively in the water; and the walrus, from which the natives obtain their ivory and oil. In the adjacent seas whales are abundant, and cod, herring, and halibut are found in prodigious numbers, at the proper seasons. A small fish called the ulikon, upward of a foot in length and of a silvery hue, is also very abundant along some parts of the coast, and is remarkable as being the fattest of all known fish. The various species of salmon which throng the Alaskan rivers occur in numbers so great as almost to exceed belief. The weak and injured fish which die after spawning time are sometimes thrown up along the river banks by the waves, to the depth of three or four feet. Immense quantities of salmon and other river fish are caught and dried. In summer, Alaska is the nesting place of myriads of migratory birds. Geese and ducks, swans, ospreys, eagles, and gulls arrive about the first of May from southern latitudes, and remain till early autumn, when they leave the country to the ptarmigan, the white hawk, and the arctic owl. The rich berries of the interior afford them excellent food. Here the nests of the canvas-back duck, so long sought for in vain in other regions, were first discovered. Mosquitoes abound during the summer months along the Yukon valley. Beetles and several varieties of butterfly are known to occur.—The natives of Alaska may properly be classed into two divisions: the Esquimaux and kindred tribes, and the Indians. To the first belong the inhabitants of the Aleutian islands, and the Innuits, who are settled on the islands along the coast from Behring strait to Mt. St. Elias. Their intercourse with the Russians has deprived the Aleuts of all their national characteristics; but they are as yet by no means civilized, though many of them profess the Christianity of the Greek church. Hunting the fur seal and sea otter is their principal occupation. Of the Indians, the Co-Yukon is the largest tribe on the Yukon river. They dwell during the winter in underground huts, and are greatly feared by the surrounding natives of other tribes, on account of their fiercer nature and superior prowess.—The fisheries and the fur trade are the leading industries of the territory. In 1870 the product of the fishery, in salted codfish alone, was 10,612,000 lbs. The taking of fur seals, which is for the most part restricted to the Pribyloff islands, is now regulated by act of congress, the privilege being under rental to a corporation at $55,000 per annum. The yield has been much diminished by the unwise and indiscriminate slaughter permitted in past years, but under the present regulations a steady production of 100,000 skins per annum can probably be secured. In 1869, 85,901 seals were taken on St. George's and St. Paul's. The average annual yield of the sea-otter skins is 1,300, and they are worth $100 each. In 1867–'8 furs to the amount of $100,000 were produced by the Yukon district, and the average product is not less than $75,000 worth per annum. The total annual yield of furs from the rest of the continental portion of Alaska does not exceed $10,000 in value. There is a small trade in ice with California, and timber is exported in limited quantities. A large proportion of the whale oil and bone taken by the Behring sea whaling fleets is derived from Alaskan waters. —Russia acquired her American possessions by virtue of the right of discovery. On July 18, 1741, Vitus Behring, the celebrated Russian explorer, discovered the rocky range of mountains, the crowning peak of which is Mt. St. Elias. Subsequently, and during the same voyage, he visited many of the Aleutian islands, until finally he was overtaken by death at that which bears his name. In 1778 Captain Cook, the English navigator, explored the Alaskan coast, and sailed far up into the bay now known as Cook's inlet, in hopes that it would prove the northern passage homeward to Great Britain. Numerous Russian commercial expeditions visited the new region, and in 1783 a trading establishment was opened on the island of Kadiak. Similar enterprises followed in other localities; and in 1799 the Russian-American fur company was organized under sanction of the emperor Paul, by a consolidation of all the companies then existing in the territory. This corporation was granted the exclusive right of hunting and fishing in the American dominion of the czar. It established a line of forts and trading posts along the coast from Norton sound southward, with occasional stations further inland, and after Sitka was founded the headquarters were removed from Kadiak to that place. The country was ruled by the company, the chief director of which exercised absolute sway throughout the colony till 1862, when, the charter having expired, the government declined to renew it, in consequence of the abuses which had grown up. The company, however, continued in control by permission of the home authorities. In 1865–'7 the territory was explored by a scientific corps sent out from the United States to select a route for the Russo-American telegraph line, a project which was abandoned in consequence of the successful laying of the Atlantic cables. Negotiations were begun in 1867 for the purchase of the country by the United States; $7,200,000 was the price agreed to be paid, and the treaty was ratified by the senate on May 20 of the same year. On Oct. 18 Brig. Gen. Lovell H. Rousseau of the United States army, having been appointed commissioner for that purpose, formally took possession of the territory in the name of the United States. Alaska constitutes a military and collection district, with headquarters at Sitka.—See "Travels and Adventures in Alaska," by Frederick Whymper (London, 1869), and "Alaska and its Resources," by W. H. Dall (Boston, 1870). (See supplement.)

ÁLAVA, one of the Basque provinces of Spain, separated from Old Castile on the S. W. by the Ebro, and from Biscay and Guipuzcoa on the N. by mountain ranges; area, 1,203 sq. m.; pop. in 1867 (estimated), 102,000. The mountains ramify over the whole province, and yield a great variety of minerals, stone, and timber. There are numerous mineral springs. The soil is most fertile along the Ebro, in the Rioja Alavesa, where chiefly wine and fruits are produced; and in the other valleys abundance of maize, hemp, and garden fruits are raised. The inhabitants are almost exclusively Basques. (See BASQUES.) The chief towns are Vitoria, the capital, Orduña, Treviño, and Salvatierra.

ALB, a vestment of white linen or linen and lace, reaching to the feet, and bound around the waist by a cincture, worn by sub-deacons and all the superior orders of the clergy in the Roman Catholic church, while officiating in the more solemn functions of divine service.

ALBA, a city of Italy, province of Cuneo, on the Tanaro, 33 m. S. S. E. of Turin; pop. about 10,000. It is a bishop's see, and has an ancient cathedral. There is a large trade in cattle.

ALBACETE. I. A S. E. province of Spain, forming a part of the old kingdom of Murcia; area, 5,965 sq. m.; pop. in 1867 (estimated), 221,000. Large portions of the province are level, and the soil is in general very fertile; but the surface is varied, and in the west mountainous. The principal rivers are the Segura, Mundo, and Jucar. The chief towns are Albacete, Almansa, Villarobledo, Caudete, Alcaráz, Tobarra, Hellin, and Segura. **II.** A city, capital of the preceding province, situated in a fertile plain on the highway and railroad between Madrid and Cartagena, 135 m. (direct) S. E. of Madrid; pop. in 1860, 17,088. The town is well built, and has been called the Sheffield of Spain from its former large business in cutlery; but the manufacture has greatly declined, and the chief productions now are coarse daggers and sword knives (*puñales*). There is a large general trade with other towns.

ALBA LONGA, one of the most ancient cities of Latium, and the mother of Rome, was, according to the Roman legends, built by Ascanius or Iulus, the son of Æneas. It is said to have been called Alba from a white sow found in its vicinity by Æneas, and Longa from its form. Its last kings of the Ascanian line were Numitor, the grandfather of Romulus, and Amulius. The Curiatii fought for its independence and supremacy against the Horatii of Rome. It was destroyed by Tullus Hostilius, except the temples, and its inhabitants were removed to Rome about 650 B. C. Strabo says it stood on the declivity of Mount Albanus, east of the lake of the same name.

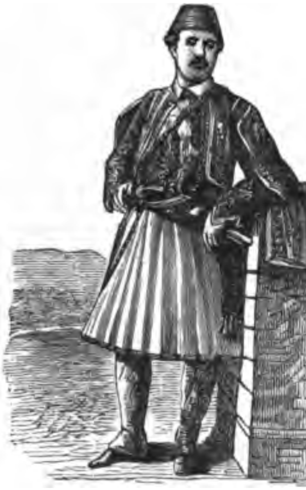
ALBAN, Saint, said to have been the first martyr for Christianity in Britain. He was born in the town of Verulamium, went to Rome in company with Amphibalus, a monk of Caerleon, became a Christian, and returned after serving seven years in the Roman army. It is generally believed that he suffered martyrdom at the time of the persecution of Diocletian, but authorities differ as to the precise date. Bede fixes it at 286; Usher reckons it among the events of 303. About 400 or 500 years after his martyrdom, Offa, king of the Mercians, built a large monastery in honor of him. Around this monastery grew up the present town of St. Albans in Hertfordshire.

ALBANENSES, the name given by some writers to that division of the Catharists who believed in an absolute dualism, in opposition to the Concorrezenses and Bagnolenses, who believed in one supreme principle. The name is derived from the town of Alba, on the Tanaro, in Piedmont, where the sect had one of its chief communities. Another community was at Donnezachum (probably Donzenac) in southern France; after which place it was also sometimes called. (See CATHARISTS.)

ALBANI, or **Albano, Francesco,** an Italian painter, born in Bologna, March 17, 1578, died Oct. 4, 1660. He studied under Denis Calvaert and Ludovico Carracci. His frescos in the national church of the Spaniards in Rome brought him into notice. His fame is chiefly founded upon his smaller paintings. He loved to paint pleasant landscapes, Venus and Cupid, young girls and children, his own 12 children by his beautiful second wife serving him as models for his finest figures.

ALBANIA, in ancient geography, a country of Asia, bordering on the Caspian sea, and bounded W. by Iberia, N. by the Ceraunian branch of the Caucasus, and S. by the Cyrus (Kur) and the Araxes (Aras). It comprised portions of modern Daghestan, Lesghistan, and Shirvan. Its inhabitants were a handsome and warlike people, of Scythic race, probably identical with the Alani. They brought a formidable army into the field against Pompey. Though often defeated, they were never subdued by the Romans.

ALBANIA (called by the natives *Shkiperia*, and by the Turks *Arnautlik*), a province of European Turkey, between lat. 39° and 43° N. and lon. 19° and 21° 30′ E., extending for about 290 miles along the Adriatic and Ionian seas, and having a breadth in the centre and parts of the north of upward of 100 miles, and in the south, near the gulf of Arta, of not more than 40 miles. It is bounded on the N. by Montenegro and Bosnia, on the E. by Turkish Servia, Macedonia, and Thessaly, and on the S. by the modern kingdom of Greece. Pop. estimated at 2,000,000. Albania embraces ancient Epirus, Illyris Græca, and the adjoining parts of ancient Dalmatia. The ridge of mountains anciently chiefly known as the Scardus and the Pindus forms its ill-defined northern and eastern boundary. The general character of the country is rugged and mountainous. Nine ranges of hills intersect it from N. E. to S. W., with elevations of from 4,000 to 8,000 feet above the sea, and covered with snow three fourths of the year. The rivers are inconsiderable, and many of them during the summer are quite or nearly dry; the most important are the Drin and the Voyutza. There are several lakes, among them those of Scutari, Ochrida, and Janina. In the mountains and forests there are bears, wolves, wild hogs, and deer; sheep, goats, and cows are tended in the valleys; and there is an excellent breed of horses. Eagles and various kinds of birds are plentiful, and hawking is the favorite amusement of the wealthy classes. The varied vegetation exhibits many forms similar to those of the Swiss Alps and the mountains of Scotland. The exports of Albania consist of oil, wool, maize, tobacco, horses, sheep, goats, timber, and some embroidered velvets and cloths. Merchandise is carried inland by means of pack horses, four or five of which are attached together by cords and guided by one man. The vigorous administration of Ali Pasha, by building roads and suppressing gangs of robbers, added much to the facility of internal traffic.—Lower or southern Albania constitutes the eyalet of Janina, and upper Albania comprises the greater part of the divisions of Prisrend, Monastir, and Scutari. Among the most remarkable tribes is that of the Mirdites in the north, whose territory has never been invaded by the Turks, and who acknowledge no subjection to the Porte, except in supplying a contingent to the army in case of war. The Albanians are muscular, active, and erect. The women are tall and strong, with an air indicating ill treatment and laborious work. The dress of the people is fantastic and complicated. The wealthy Albanian wears over a close-fitting vest, buttoned to the throat, an open jacket, with open sleeves, richly embroidered. A frilled skirt falls to his knees from a broad girdle, in which are stuck his silver-mounted pistols, on the ornamentation of which he spends extravagant sums, and his yataghan. Cloth leggings, likewise embroidered, cover the legs, and he wears the fez. A peculiar garment, assumed when travelling, is the capote, a cloak of wool or horse-hair. The Albanians are a nation of warriors, early trained to discipline, and constituting the best soldiers in the Turkish army. Their national name is Shkipetars; the Turks call them Arnauts. Wallachs and Greeks live scattered among them. A rude kind of Mohammedanism has gradually supplanted the Christianity of the country.—Though Albania has several times changed its name, its masters, and its boundaries, a people cherishing unchanged their nationality, language, and manners have from the earliest records of history occupied its mountains. First, the fierce tribes of Epirus and the still more savage Illyrians had possession of the country, and withstood alike the efforts of the Greeks and of the Romans to civilize them. On the conquest of Constantinople by the Latins in 1204, one of the imperial family of Comnenus succeeded in establishing a dynasty in this district, and the despots of Albania continued for two centuries only second in power to the emperors of Constantinople. Mohammed II., having conquered Constantinople, marched against the Albanians, only to experience a succession of defeats. The heroism of George Castriota, commonly known in history as Scanderbeg or Iskander, their last independent prince, resisted for more than 20 years the whole force of the Ottoman empire, and it was not till his death in 1467 that Albania was annexed to the Turkish dominions. Albania was divided into several distinct pashalics till the close of last century, when Ali Pasha, having married the daughter of the principal chief, succeeded in establishing himself as an independent sovereign over all its territory, and a wide extent beyond. After his overthrow, and during the insurrection of the Greeks, the



Albanian Costume.

Albanians were inclined to make common cause with the latter; but their attempts to coöperate in the war produced only their massacre and harsh treatment by the Greeks, and they were therefore thrown into the arms of the Porte, to which they have since continued nominally subject.—The Albanian language belongs to the Indo-European family of languages, and is spoken in different dialects in the north and south. The original stock of words is believed to have been derived from the ancient Illyrians, but it is mixed up with Greek, Latin, Turkish, Italian, French, and Slavic. Many of the Albanians, particularly the Toskaris in the south, speak the modern Greek, and in that part of the country the Albanian proper is also more mixed with Greek than the Geg dialect in the north. Xylander and Bopp have written on the Albanian language. The work of the latter, *Ueber das Albanesische*, was published in Berlin in 1855. Both the Latin and Greek alphabets are used in Albanian books. Latin letters have been adopted in the translation of the New Testament (Constantinople, 1866), and in versions from the gospel of St. Matthew by Prince Louis Lucien Bonaparte, with occasional Greek letters, and in other contemporary works. Greek letters have been used by Anastasio Kulurioti (Athens, 1866), by Salterio (Constantinople, 1868), and in the *Alfabeto generale Albano-Epirotico* (Leghorn, 1869), which last is also contained in *A Dora d'Istria gli Albanesi* (Leghorn, 1870). An Albanian grammar has been lately published at Leghorn (*Grammatologia Albanese*). Prince Louis Lucien Bonaparte's version of the parable of the sower in Matthew has been published under his auspices in the Siculo-Albanese, the Calabro-Albanese, and the Scutari-Albanese dialects (London, 1868-'70). Albanian literature consists chiefly of popular songs and fairy tales. The late Austrian consul at Syra, Mr. de Hahn, is a high authority on the subject in his *Albanesische Studien* (Jena, 1854), and *Griechisch-Albanesische Märchen* (2 vols., Leipsic, 1864). Dora d'Istria, the author of the "Mussulman and Roumanian Albanians," has in other recent publications thrown much light upon the Albanian language and poetry.

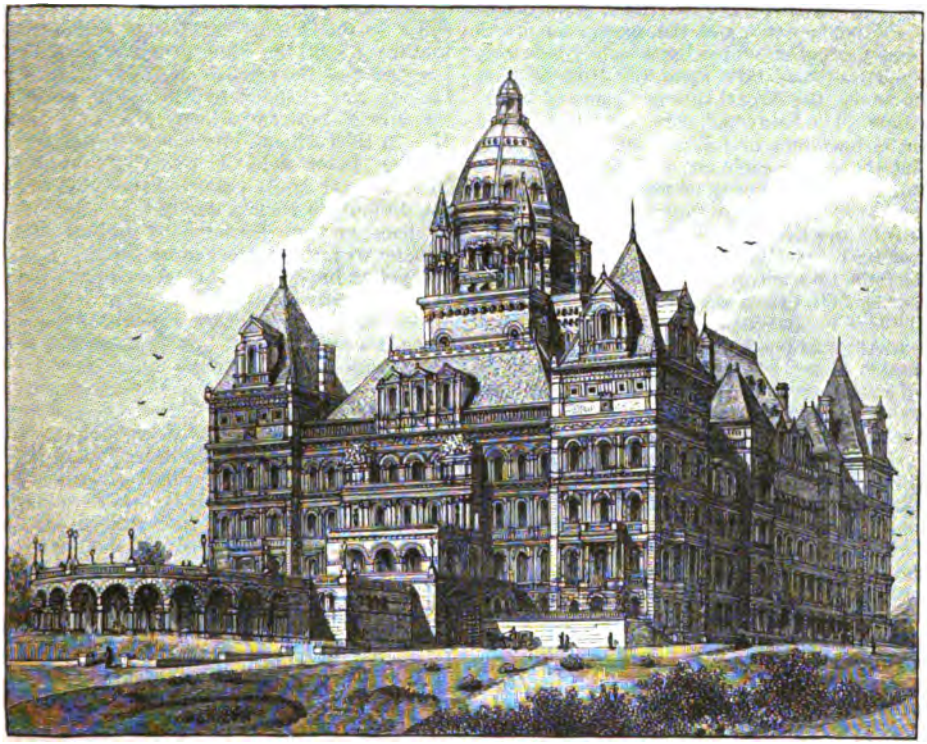
ALBANO (anc. *Albanum*), a city of Italy, in the province of Rome, near the southern extremity of Lake Albano, 14 m. S. E. of Rome; pop. 5,200. It occupies the site of Pompey's villa, and is on the opposite side of the lake to that of ancient Alba Longa. It is a favorite summer resort of the Roman nobility on account of its beautiful scenery and pure air. It possesses a museum of antiquities and many fine ruins. The Albano wine, which is made in the vicinity, was already famous among the ancient Romans. The lake of Albano, or Lago di Castello, is in the crater of an extinct volcano, and is surrounded by huge basaltic rocks.

ALBANY. **I.** An E. county of New York, bounded E. by the Hudson river and N. in part by the Mohawk; area, 509 sq. m.; pop. in 1870, 133,052. Normanskill and Catskill creeks furnish it with good water power. The land near the Hudson and some of the other streams is fertile; but in the N. and W., where the surface is mountainous, it is less productive, and in some places sterile. The E. part is covered with immense beds of clay, sand, and gravel, the sand in some places being 40 feet deep. Iron, hydraulic limestone, marl, and gypsum are found, though they are not abundant. The productions in 1870 were 14,859 bushels of wheat, 129,535 of rye, 165,350 of corn, 784,146 of oats, 37,205 of barley, 160,594 of buckwheat, 637,058 of potatoes, 115,655 tons of hay, 137,641 lbs. of wool, 1,142,783 of butter, and 133,964 of hops. In 1865 the value of farms was $16,951,183, of stock $1,820,876, and of tools $797,486. There were 864 manufacturing establishments, employing 9,292 hands, 180 churches, 18 newspapers and periodicals, and 7 savings banks. The Erie and Champlain canals and several railroads terminate in this county. The assessed value of real estate in 1870 was $38,557,176, and of personal property $7,535,171. Besides Albany, the capital, Cohoes and West Troy are important maufacturing places. Albany county was organized in 1683, and originally extended E. of the Hudson, and included the whole colony N. and W. of its present limits. **II.** An E. county of Wyoming, occupying the whole width of the territory, about 265 m.; area, about 12,000 sq. m.; pop. in 1870, 2,021. The Union Pacific railroad passes through the S. part of the county. Capital, Laramie.

ALBANY, a city, capital of Albany county and of the state of New York, at the head of sloop navigation and near the head of tide water, on the W. bank of the Hudson river, in lat. 42° 39′ 3″ N., lon. 73° 32′ W., 145 m. N. of New York city, 164 m. W. of Boston, and 370 m. N. E. of Washington. According to the official censuses, the population of Albany in 1790 was 3,506; in 1800, 5,349; 1810, 10,762; 1820, 12,541; 1830, 24,238; 1840, 33,762; 1850, 50,762; 1855, 57,333; 1860, 62,367; 1865, 62,613; 1870, 69,422. But the population now (1873) is probably not far from 80,000, as the boundaries have been enlarged by the addition of parts of Bethlehem and Watervliet, and the territory now comprised within the city limits had in 1870 a population of 76,216. At a little distance from the river the ground rises into a plateau about 200 feet above tide level, and then extends westward in a sandy plain. The slope toward the river is divided into four distinct ridges, separated by valleys, which were originally deep and difficult to cross; but these have been much improved by grading, and within a mile from the river nearly disappear. The tide rises about one foot in the river here. Notwithstanding the occasional obstruction of navigation by the "overslaugh" (see Hudson River), Albany is peculiarly favored as a commercial town.

View of Albany from Greenbush.

The Erie canal terminates in a basin here, and the New York Central and Hudson River railroad passes through the northern border of the city, crossing the Hudson river upon a bridge. The Albany and Susquehanna railroad extends to Binghamton on the Erie railway; the Albany and Vermont railroad connects with lines to Vermont and Canada; and the Boston and Albany railroad terminates on the opposite side of the river. The extension of the Walkill Valley railroad to Albany was permitted in 1870, and a railroad on the west shore of the Hudson southward has been proposed, but neither has yet been built. A road is also projected from opposite Albany to Sand Lake. The Hudson river bridge, built of timber, was opened Feb. 22, 1866. It has 21 piers, a draw which leaves an open passage 110 ft. wide on each side when turned, 4 spans of 172 ft., and 14 of 72 ft. each. It is 1,953 ft. long, and including the approaches 4,253 ft., and cost with real estate, &c., about $1,100,000. The bridge company, consisting of the railroads in interest, having been authorized to construct a new bridge near the foot of Exchange street, while retaining the former, it was commenced in May, 1870, and finished Jan. 1, 1872. It is an iron truss bridge, 1,014 ft. long and 30 ft. above the water, with 11 spans and a draw of 274 ft. It is used only for foot passengers and passenger trains, while the former is used for freight. —The old state capitol, a plain brown stone structure built in 1807 for $173,000, is still occupied, but will be demolished as soon as the costly new capitol is finished. In 1865 an act was passed authorizing the erection of a new capitol, on condition that the city of Albany should give to the state for the purpose the ground commonly known as the Congress Hall block, extending from State street to Washington avenue, immediately in the rear of the old capitol. In 1867 the first appropriation of $250,000 was made for the building, and the corner stone was laid June 24, 1871. The material is Maine granite, and the edifice will be the largest and most splendid in America, excepting the federal capitol at Washington. The ultimate cost can only be conjectured, but up to Jan. 1, 1872, when the foundation and basement story only had been erected, the expenditure already amounted to $2,037,670 41. The state library, a handsome fire-proof building fronting on State street, in rear of the old capitol, contains 86,000 volumes; its law section is the strongest and best. In February, 1872, congress appropriated $350,000 for a building in Albany to accommodate the United States courts, post office, custom house officials, &c., the city giving the site.—Among the state institutions are the geological and agricultural hall, and a state normal school established in 1844 for educating teachers in common schools. The state hall on Eagle street, built of white marble in 1848 at a cost of $350,000, contains the offices of the secretary of state, attorney general, comptroller, treasurer, canal board, superintendent of public instruction, &c. The city hall, on Eagle street, foot of Washington avenue, a beautiful structure of white marble, was finished in 1832. It is 100 ft. front by 80 deep, three stories high, and has in front a recessed porch in the second and third stories, supported by six Ionic columns. In 1869–'70 a new city building was erected on S. Pearl street at a cost of $200,000, and is used by the police and civil justices' courts, fire and police departments, park commissioners, assessors, &c. Among the local institutions most worthy of note are the merchants' exchange, the Dudley observatory, the Albany medical college, the law school of the university of Albany, the city hospital, the St. Peter's hospital, the Albany and the St. Vincent orphan asylums, the city dispensary, the home of the friendless, the Albany institute, the young men's association, the young men's Christian association, the Albany academy, the Albany female academy, the academy of the Sacred Heart, and the academy of the Christian Brothers. The Dudley observatory, named after Charles E. Dudley, once mayor of Albany and United States senator, and founded by the gifts of his widow (Mrs. Blandina Dudley) and others, was incorporated in 1852 and dedicated in 1856. It has a valuable special library, a 13-inch equatorial instrument, a meridian circle, a transit instrument, a calculating and printing engine (the only one in the country), and self-recording meteorological instruments of many kinds. It gives exact time by telegraph to the city and to various railroads. The young men's association, formed in 1833, supports a lecture course during the winter, and has a library of above 12,000 volumes, and a reading room supplied with 75 papers and 30 other periodicals. It is the oldest institution of the kind in the United States, and has about 1,100 members. There are 54 churches: Baptist, 5; Congregational, 2; Protestant Episcopal, 6; Evangelical, 2; Friends', 1; Jewish, 3; Evangelican Lutheran, 4; Methodist Episcopal, 8; Presbyterian, 6; Reformed Protestant Dutch, 6; Roman Catholic, 10; and United Presbyterian, 1. A Reformed Protestant Dutch church was formed in 1640, and a quaint edifice of this order stood in State street at Broadway till 1806. A Lutheran church was formed in 1680, a Protestant Episcopal in 1715, and a Roman Catholic society in 1796. The communion plate of St. Peter's church was presented by Queen Anne for the Onondaga Indians. The number of public schools is 16, of which one is for colored children; there is also a free academy with 8 teachers and 214 pupils. The penitentiary, situated on the west of the city, about a mile from the capitol, was built in 1845–'6, and has 600 cells. At the close of 1871 there were about 500 convicts, a large number of whom were prisoners of the United States. The contract system of labor is adopted, the men being employed in shoemaking and the women in chair-seating. The income exceeds the expenditure by a sum varying from $10,000 to $20,000 a year, while in all the other penitentiaries of the state there is an annual deficiency of from $50,000 to $125,000. There are no pun-


The New Capitol at Albany, N. Y.

ishments for refractory prisoners except confinement in a solitary cell. School is kept for those who choose to attend on two evenings of the week, and there is a library of 1,400 volumes. In 1869 the old burial grounds, penitentiary grounds, almshouse farm, and Washington parade ground, in the western part of the city, were set apart for a public park, to be known as "Washington Park."—For 30 years after the revolution, Albany was the seat of the entire trade of the western part of the state, the produce being brought in by sleighs in winter; but the growth of the city was not rapid. The first great impulse to its commercial prosperity was given by the successful trip of the Clermont, the first steamboat of Fulton, in 1807, and the improvements in steam navigation which immediately followed. The steamboats now upon the Hudson river are among the largest that navigate any inland waters. The Erie canal, completed in 1825, and the various lines of railroad constructed since that time, have each essentially added to the growth and prosperity of the city. The total amount of property reaching tide water at Albany by the Erie and Champlain canals for the year 1871 was 848,829 tons, valued at $15,806,259; the total cleared from Albany the same year by both canals was 82,079 tons, valued at $4,758,971; and the amount of canal tolls collected at this place was $2,837,077. The total number of cars of grain inspected at Albany in 1871 was 2,595; the sales of grain at the corn exchange here the same year aggregated 3,947,000 bushels. The lumber market of Albany is the largest in the state; the value of the boards, shingles, timber, &c., received here in 1870 was nearly $10,000,000. There are 32 slips from the river for receiving boats, and a river dock more than a mile long for loading boats and barges. There is also in the river a pier, not connected with the shore, about 1,100 feet long. The Albany board of lumber dealers was incorporated in 1869, and in 1871 there were 57 firms engaged in this trade. The city is the seat of very important and extensive manufactories, of which the most numerous are 9 boiler and steam engine works, 18 boot and shoe factories, 18 breweries, 17 carriage builders, 10 flouring mills, 18 harness factories, 4 piano factories, 18 iron founderies, 17 machine shops, 8 sawing and planing mills, 12 stove founderies, and 11 soap and candle factories, besides extensive factories of car wheels, saws, oilcloth, agricultural implements, jewelry, silver ware, cabinet furniture, &c. The city has 9 banks, 6 savings banks, 6 insurance companies, and 7 daily, 1 tri-weekly, 2 semi-weekly, 5 weekly, and 2 monthly periodicals.—Albany is the oldest settlement in the original 13 colonies except Jamestown, Va. Henry Hudson, in the yacht Half Moon, moored in September, 1609, at a point which is now in Broadway, Albany. Several Dutch navigators ascended the river to the same place during the next three or four years, and in 1614 the Dutch built the first fort on an island below the present city, which is hence called Castle island. In 1618 a fort was built at the mouth of the Normanskill; and in 1623 another was erected near the present steamboat landing in the south part of the city and named Fort Orange. A quadrangular fort called Fort Frederick was afterward built on the high ground, now State street, between St. Peter's church and the geological hall, with lines of palisades extending down Steuben and Hudson streets to the river. These fortifications were demolished soon after the revolution, and the only evidence of their existence now remaining is the curved outlines which they have given to the streets in the older parts of the city. The place was called by the Dutch New Orange, and retained that name until the whole province passed into possession of the English in 1664, when New Orange was changed to Albany, in honor of the duke of York and Albany, afterward James II. In 1686 Albany city was incorporated by patent. Peter Schuyler was the first mayor. The Schuyler family possessed the good will of the Indians to such a degree that while other settlements were desolated by Indian forays, Albany was never attacked by them. Besides its ancient importance as a centre of the Indian trade, Albany afterward became the point where the great military expeditions against Canada were fitted out. It was fortified at an early period, and although often threatened with invasion, no hostile army ever reached the city. Here assembled the first convention for the union of the colonies. It was held in 1754, and Benjamin Franklin was its leading member. The ostensible object of this convention was the defence of the colonies against the savages, but the plan of union then drawn up and adopted was the first recorded in the history of the country. Albany became the state capital in 1797. It has been visited by several disastrous fires, of which those in 1797 and 1848 were most destructive. The lower part of the town has often been inundated.

ALBANY, an eastern district of Cape Colony, on the coast, traversed by the Sneeuw (snow) mountains and some other ranges, and by the Great Fish river; area, 1,792 sq. m.; pop. in 1865, 16,264, including 4,229 Caffres and 1,472 Hottentots. The surface is undulating, and the scenery varies from rugged heights to pleasant plains. The climate is healthy. The soil produces wheat, maize, barley, oats, and cotton. A chief occupation of the settlers is stock raising. Capital, Graham's Town.

ALBANY, Louise Marie Caroline Héloïse, countess of, wife of the last of the Stuarts, and celebrated for her association with the poet Alfieri, born in Mons, Belgium, Sept. 20, 1753, died in Florence, Jan. 29, 1824. She was a daughter of Prince Gustavus Adolphus of Stolberg-Gedern, who fell in the battle of Leuthen. In 1772 she became the wife of Charles Edward Stuart, grandson of James II., and pretender to the British crown, known as the count of Albany, who was her senior by 33 years. The marriage was said to have been arranged with the hope of menacing the English sovereign with a legitimate heir to the rival Stuart dynasty. It proved most unhappy. She was young, refined, intellectual; he old, coarse, and intemperate. They lived at Florence, where she became acquainted with the poet Alfieri, who conceived a passionate regard for her. It was under her guidance that he began to write his tragedies. She was never charged with infidelity to her husband, whose brutality, however, became so unendurable that she left him, and sought refuge in a Florentine and subsequently in a Roman convent. In 1783 she obtained a formal separation from him through the interposition of Gustavus III. of Sweden, who also procured for her a pension from the French government, which was withdrawn after the outbreak of the revolution. About a year after her husband's death (1788) the countess is said to have been secretly married to Alfieri, but they never appeared in public as husband and wife, though he was constantly in her society at Paris, London, and Florence, where she was received with distinction in the highest circles. In Florence her social and political influence was so great that Napoleon dreaded it almost as much as that of Mme. de Staël and of Mme. Récamier, especially in view of Alfieri's opposition to his rule. After the death of Alfieri (1803) the countess resided chiefly at Florence, where she is said to have formed an intimate relation with François Xavier Favre, a French painter. Alfieri says in his autobiography that without her inspiring influence he would have achieved nothing. She was buried in the church of Santa Croce at Florence, in the same tomb with Alfieri, which is adorned with a monument by Canova. A biographical work entitled *Die Gräfin von Albany* has been published by Reumont (2 vols., Berlin, 1860).

ALBATEGNIUS, or **Albategni** (properly MOHAMMED BEN GEBER ALBATANI), an Arabian prince and astronomer, died about A. D. 929. He is also called Muhamedes Aractensis. His principal astronomical work—mainly an abridgment of the Almagest of Ptolemy, though containing many original principles and observations—was translated into Latin by Plato of Tibur, and published at Nuremberg in 1537, and afterward at Bologna in 1645. In the opinion of Lalande, he was one of the 20 most eminent astronomers that ever lived.

ALBATROSS (*diomedea*), a genus of web-footed sea birds, which has three species—the common albatross, *D. exulans*, the albatross of China, *D. fuliginosa*, and the yellow and black-beaked albatross, *D. chlororynchos*. The genus is distinguished principally by a very strong, hard, straight beak, which suddenly curves downward, with a sharp hook at the point. The feet are short; the three toes long and completely webbed; the wings very long and narrow. The common albatross is the largest sea bird known, weighing from 12 to 28 lbs. The usual extent of its wings is about 11 feet; but a specimen in the Leverian museum measured 13 feet, and one was shot off the Cape of Good Hope of 17½ feet in extent. The top of its head is ruddy gray; all the rest of its plumage white, with the exception of a few transverse black bands on its back, and a few of the wing feathers. It is abundant from the Southern ocean to Behring strait and the coast of Kamtchatka, frequenting the inner sea about the Kurile islands and the bay of Penshinsk, in vast flocks, but scarcely visiting at all the eastern or American coasts. Its voracity is extreme, and it is said that it will often swallow whole a salmon of four or five pounds weight. Its ordinary food is fish, fish spawn, and small shell fish; but it does not hesitate to take any animal substance found floating on the surface of the waves, and is often taken by sailors with a line and hook baited with a piece of fat pork. Its powers on the wing are extraordinary, as might be presupposed from the extreme lightness of its immense hollow wing bones, which are said by Edwards to be as long as the whole body, and which the Kamtchatdales use as tobacco pipes; and from the great height, power, and continuance of its flight, sailors, who know it generally as the "man-of-war bird," among other strange notions, believe that it sleeps on the wing.

Albatross (Diomedea exulans).

AL-BELADORI, Abul Hassan Ahmed, an Arabian historian, died about 895. He was minister of religion at Bagdad, resided at the court of the caliph Motawakkel, and was intrusted with the education of one of the princes of the caliph's family. He wrote a work giving the history of the conquest of Syria, Cyprus, Mesopotamia, Armenia, Egypt, Nubia, northern Africa, Spain, and the Mediterranean islands, and an account of the spread of the Mohammedan religion over Persia, Transoxiana, and the countries on the shores of the Indus.

ALBEMARLE, a central county of Virginia, bounded N. W. by the Blue Ridge mountains and S. by the James river, and watered by its branches; area, 700 sq. m.; pop. in 1870, 27,544, of whom 14,994 were colored. The surface is undulating, soil very rich in the valleys and river bottoms, and the scenery picturesque.

The productions in 1870 were 218,545 bushels of wheat, 384,851 of corn, 180,461 of oats, and 1,781,619 lbs. of tobacco. The Chesapeake and Ohio and Orange, Alexandria, and Manassas railroads intersect at the capital, Charlottesville.

ALBEMARLE SOUND, a large inlet of the sea on the northern part of the coast of North Carolina, extending 60 m. into the country, and having a width of from 4 to 15 m. It is separated from the sea by a narrow island, is not affected by the tides, receives the waters of the Roanoke and Chowan rivers, and is nearly fresh. It has connection with Currituck and Pamlico sounds by inlets, and with Chesapeake bay by a canal cut through the Great Dismal swamp. This sound has not a great depth of water, and is of comparatively little value for commercial purposes.

ALBERGATI-CAPACELLI, Francesco, marchese d', an Italian dramatic writer and actor, born in Bologna, April 29, 1728, died March 16, 1804. He has been called the Garrick of Italy. His youth was wasted in debauchery, but at the age of 40 he had acquired a high reputation by his dramatic compositions, and as a wit and actor. His works appeared in 12 vols. (Venice, 1783-'5), and 6 vols. (Bologna, 1784).

ALBERIC I., a ruler of Rome in the early part of the 10th century. He was originally a Lombard nobleman, but obtained through the aid of Berengarius of Friuli the marquisate of Camerino, and by his marriage with Marozia, the daughter of the notorious Roman Theodora, the temporal authority over Rome. He joined Pope John X. in the expulsion of the Saracens. He also ruled the duchy of Spoleto. He was, however, banished from Rome, and finally murdered in 925. His widow wedded Guido of Tuscany, and after his death Hugo of Provence, king of Italy, who was afterward expelled by her son, ALBERIC II., who reigned over Rome until his death in 954.

ALBERONI, Giulio, a Spanish statesman, born near Piacenza, Italy, May 31, 1664, died in Rome, June 16, 1752. He was the son of a vinedresser, and was brought up to the church. In the war of the Spanish succession he gained the favor of the duke of Vendôme, commanding the French troops in Italy, and accompanied him to Paris in 1706, and to Spain in 1711, acting as his secretary. In 1713 he was appointed envoy of the duke of Parma at the Spanish court. He was befriended by the celebrated Princess Orsini; but, having induced her to employ him in negotiating the marriage of Philip V. with Elizabeth Farnese of Parma, his first act after the queen's arrival was to urge her to apply for the dismissal of the princess, who was at once arrested and banished. He became prime minister of Spain in 1714, and in 1717 was made a cardinal by Clement XI. His internal administration was distinguished for economy, the encouragement of industry, and the development of the resources of Spain. He remodelled the army, rebuilt the fleet, strengthened the defences, and increased the foreign commerce. But the ambition of restoring Spain to her former greatness, seconded by the queen's ambition for the aggrandizement of her family, prompted him to a violent foreign policy. He seized on Sardinia in a time of peace (1717), invaded Sicily (1718), entered into adventurous schemes with Charles XII., Peter the Great, and the Stuarts against France and England, plotted a conspiracy to depose the regent Orleans, and embroiled Spain with all the other powers of Europe, bringing about the quadruple alliance of England, France, Austria, and Holland. Alberoni's courage rose with the danger, and he bade defiance to all his enemies at once. The foreign alliance and the hatred of the grandees at home, however, hurled him from place. Peace was concluded in 1719, one of the stipulations of which was Alberoni's dismissal, and he was ordered to quit Spain without delay. He fled to Italy, whither his foes pursued him, and induced Clement XI. to issue a warrant for his arrest. This he managed to escape, wandering about in circumstances of danger and privation; but on the pope's death (1721) he appeared at Rome in the conclave, and assisted at the election of Innocent XIII., who refused to molest him. He was afterward sent as legate into the Romagna, and finally retired to his native state, where he died at the age of 88. He left a number of MSS., from which his "Political Testament" was published at Lausanne in 1753.

ALBERS, Johann Friedrich Hermann, a German physician, born at Dorsten, Nov. 14, 1805, died in Bonn, May 12, 1867. He practised several years as assistant physician, afterward delivered lectures on pathology at Bonn, and in 1831 was appointed professor there. He also established at Bonn a private hospital for mental and nervous diseases. He is the author of an "Anatomical Atlas" (287 plates, with text, 1832-'62), and works on general pathology, pharmacology, diseases of the larynx, syphilitic skin diseases, &c.

ALBERT, a S. E. county of the province of New Brunswick, Canada, bounded S. and S. E. by the bay of Fundy and Chignecto bay; area, 677 sq. m.; pop. in 1871, 10,672. The land is good, and there are extensively diked marshes, mines of bituminous and cannel coal, oil-bearing shales, plaster beds, and quarries of freestone. The coal and plaster are taken by a horse railroad to Hillsborough, respectively 2½ and 5½ m., and shipped principally to the United States. Petroleum was at one time largely produced. Chief town, Hopewell.

ALBERT, the pseudonyme of ALEXANDRE MARTIN, a member of the French provisional government of 1848, born at Bury, department of Oise, April 27, 1815. He was a maker of mechanical models, and continued to work at his trade after he became prominent as an agitator, and in 1840 as founder of a revolutionary journal entitled *L'Atélier*, written by working men exclusively. A friend of Louis Blanc, he became a member of the provisional government as a special representative of the working classes, and always signed himself "Albert, ouvrier." He was elected to the constituent assembly for the department of the Seine; but being implicated in the uprising of May 15, he was sentenced to transportation, and remained in prison till the amnesty of 1854. Albert does not figure in the history of the Commune of 1871.

ALBERT I. (Ger. *Albrecht*), archduke of Austria and emperor of Germany, born in 1248, died May 1, 1308. He was the son of Rudolph of Hapsburg, and succeeded to his hereditary estates, but the succession to the crown was conferred by the electors upon Adolphus of Nassau. Albert affected submission, and remitted to the new emperor the royal insignia. But on the coronation of Wenceslas of Bohemia he met four of the electors, and arranged with them a diet at Mentz, before which Adolphus was summoned to answer charges of high crimes and misdemeanors. Adolphus of course refused the requisition of any such tribunal, and the diet thereupon adjudged him guilty of contumacy, and deprived him of the crown. War was declared, the two armies met, July 2, 1298, near Gellheim, between Spire and Worms, and Albert unhorsed Adolphus in personal combat, whereupon the latter, continuing to fight, was soon despatched by the followers of his rival. Feigning a respect for the rights of the body of electors, Albert declined to exercise the supreme power until a diet had been formally convened, and he was duly elected and crowned at Aix-la-Chapelle. Pope Boniface VIII., however, stigmatized him as a murderer, and instituted a new combination against him, which was disconcerted by Albert's son Rudolph. Albert was now involved in hostilities with Bohemia, of which he made himself master for a short time; but the people rose, and he was obliged to retire. He attempted to subjugate part of Switzerland, but in crossing the river Reuss in a boat was murdered by his nephew John of Swabia, whose possessions Albert had seized during his minority. John was assisted by three noblemen. Albert's daughter Agnes terribly avenged her father's murder, though not on John himself, who escaped to Italy, and died a monk. Albert was succeeded in Austria by his son Frederick the Handsome, and in the empire by Henry of Luxemburg.

ALBERT (Ger. *Albrecht*), the first duke of Prussia, son of Frederick, margrave of Anspach and Baireuth, and grandson of Albert Achilles, elector of Brandenburg, born May 17, 1490, died March 21, 1568. He was educated for the church under the elector of Cologne, but also served in the army of the emperor Maximilian, and in 1511 was elected grand master of the Teutonic order. Refusing to take the oath of fealty to the king of Poland, he became involved in the hostilities which had subsisted for years between the order and the Poles. Sigismund I. of Poland, whose sister was Albert's mother, began the war in earnest, but, after some successful fighting, was in 1521 induced to grant a four years' truce, during which Albert solicited aid from other German princes. He betook himself to Germany, where he was persuaded by Luther to embrace the reformation and change the domains of the order into a temporal principality. At the expiration of the truce the grand master consented to hold the territory of the order as a fief from Poland, and the majority of the knights agreed to hold under Albert. Albert now threw himself heartily into the reformation movement, established new schools, and founded the university of Königsberg. Dissensions on doctrinal points between the professors of his new university involved him in troubles which lasted till his death.

ALBERT (Francis Albert Augustus Charles Emanuel), prince consort of Great Britain, prince of Saxe-Coburg-Gotha, born at Coburg, Aug. 26, 1819, died in Windsor Castle, Dec. 14, 1861. Under the auspices of his father, Duke Ernest of Saxe-Coburg-Gotha, he received a brilliant education, which he perfected by studying at the university of Bonn. In June, 1838, he visited England, and was introduced by King Leopold of Belgium to the young Queen Victoria, who in November, 1839, formally announced to the privy council that she intended to marry Prince Albert. He was naturalized by act of parliament, Jan. 21, 1840, and the marriage was celebrated Feb. 10. An annual allowance of £50,000 was at first proposed, but only £30,000 was voted. The prince was made a field marshal, knight of the garter, and chancellor of the university of Cambridge, and invested with other high titles and functions. As president of the society of arts his æsthetic tastes found ample scope for activity. The crystal palace of 1851, the forerunner of many other expositions of industry and art, was chiefly due to his zeal and enlightened knowledge. His model farm at Windsor gave a powerful impulse toward the establishment of others all over the country. His public spirit was felt in a variety of industrial and charitable undertakings, while in political affairs he exercised a wise influence over the queen without obtrusive intermeddling. Devoted to the education of the royal family, and warmly attached to the queen, he made the domestic life of the court synonymous with virtue and culture. The delicacy of his position as a German prince and as husband of the queen, without political authority, exposed him occasionally to misapprehensions; and in 1855 it was necessary for the ministry to correct in parliament the impressions which had been current in regard to his alleged partiality for alien interests in international questions. Nevertheless, he frequently saved the government from danger by his cool judgment and patriotism. Shortly before his death, during the civil war in the United

States, he was generally believed to have exercised his influence in favor of the Union. He refused the chief command of the English army, which had been proposed to him by Wellington. The title of "his royal highness prince consort" was conferred upon him by letters patent, under the great seal, June 25, 1857, so that in case of his surviving the queen he might act as regent during the minority of the prince of Wales. Victoria mourned his death with almost unexampled pertinacity. A publication in 1857 of Prince Albert's public addresses was succeeded in 1862 by a fuller work of the kind, prepared at the request of the queen. "The Early Years of His Royal Highness the Prince Consort, by Lieut. Gen. the Hon. C. Grey," was published 1867–'8. Queen Victoria's "Leaves from the Journal of our Life in the Highlands, from 1848 to 1861," edited by Arthur Helps (1868), contains interesting allusions to the excellent prince, whose memory has been perpetuated in England by many beautiful monuments.

ALBERT, Friedrich August, crown prince of Saxony, a German general, son of the reigning king John, born in Dresden, April 23, 1828. As the people over whom he is destined to rule are Protestants, while the royal family are Roman Catholics, a Protestant tutor was selected for him in the person of the Saxon historian Dr. von Langenn. In 1848–'9 he took part in the Schleswig-Holstein war. In 1854, after the accession of his father to the throne, he was called upon to preside over the council of state, having previously been a member of the upper chamber. In 1866 he commanded the Saxon army in coöperation with Benedek's Austrian forces against Prussia, and received a decoration for the excellent behavior of his troops. When Saxony was obliged to join the North German confederation and to place the armed forces under the control of Prussia, they were designated as the 12th corps of the North German army under command of Prince Albert, who highly distinguished himself at the battles of Gravelotte (Aug. 18, 1870) and Sedan (Sept. 1). He was rewarded with the Prussian iron cross, and with the rank of North German commander-in-chief over the newly formed 4th army, composed of Prussians and Saxons, at the head of which, after valuable services at the siege, he made his entry into Paris with the emperor and the other princes of Germany. He married in 1853 a princess of the Vasa family.

ALBERT EDWARD, prince of Wales, duke of Saxony, and prince of Coburg-Gotha, heir apparent to the British throne, second child of Queen Victoria and Prince Albert, born in Buckingham palace, London, Nov. 9, 1841. He was created prince of Wales and earl of Chester by letters patent Dec. 8, 1841, and earl of Dublin Jan. 17, 1850. He is duke of Cornwall pursuant to the statute of Edward III., 1337, the annual revenues of the duchy being about £50,000. In conformity with an act of the Scotch parliament in 1449, he is high steward of Scotland, duke of Rothsay, earl of Carrick, baron of Renfrew, and lord of the isles. He is a general in the army, colonel of the 10th hussars, captain general and colonel of the honorable artillery company, barrister at law and a bencher of the Middle Temple, president of the society of arts and of other societies, and chancellor of the university of Cambridge. In 1860 he visited the United States and Canada, accompanied by the late duke of Newcastle; and on March 10, 1863, he married at Windsor Alexandra, eldest daughter of Christian IX. of Denmark. His eldest son, Albert Victor, was born at Frogmore Lodge, Jan. 8, 1864. In the autumn of 1871 he was seized with a dangerous typhoid fever, which produced much public anxiety; and his convalescence was celebrated with great pomp at St. Paul's cathedral, Feb. 27, 1872.

ALBERTI, Leone Battista, an Italian architect, poet, painter, and sculptor, born in 1404, died in Rome in April, 1472. His essays on painting and sculpture are greatly admired. His most famous work, however, is a treatise *De Re Ædificatoria.* As an architect, he was often employed by Pope Nicholas V., and he designed and superintended the erection of many edifices in Florence, Rimini, and Mantua.

ALBERTINELLI, Mariotto, a Florentine painter, born about 1475, died about 1520. He was a friend and pupil of Fra Bartolommeo, and an imitator of his style. There is a beautiful painting by him in the gallery of the Uffizi at Florence, representing the visitation of Mary and Elizabeth. Fine pictures of his are found in Florence and Munich, and in the Louvre.

ALBERT N'YANZA. See N'Yanza.

ALBERTUS MAGNUS (Albert the Great), a scholar of the 13th century. He was of a noble Swabian family, studied at Padua, and entered the Dominican order. He was employed as a teacher in various schools, especially at Cologne. In 1254 he was appointed provincial of his order in Germany, and in 1260 bishop of Ratisbon. In 1262 he returned to his convent, and died there in 1280. He was perhaps the most learned man that the middle ages produced. The titles of his works fill many pages in catalogues, and all branches of human knowledge, theology, philosophy, natural history, physics, astronomy, and alchemy, are represented in them. He devoted himself especially to the study of Aristotle and of the Arab philosophy. His contemporaries, marvelling at his learning, regarded him as a magician, and he became the subject of many legendary stories. But his works prove that he had more patience than genius; he accumulates citations from his immense reading almost by chance, and settles vital problems by carefully balancing the weight of authorities. He had numerous disciples (of whom Thomas Aquinas was the most distinguished), called Albertists, who propagated his doctrines, and confirmed the vogue of Aristotle during the middle ages.

ALBI, or **Alby** (anc. *Albiga*), a town of France, capital of the department of Tarn, on the Tarn, 41 m. N. E. of Toulouse; pop. in 1866, 16,596. It has a cathedral, a museum, and a library, but is one of the least attractive towns of France. The name of the sect of Albigenses was derived from this place and its district, Albigeois. A council denouncing their tenets was held near here in 1176. Albi was one of the most important Protestant towns during the reign of Louis XIV., and the revocation of the edict of Nantes drove many of its citizens into exile.

ALBIGENSES, the collective name of various religious sects in the 12th and 13th centuries, who left the Catholic church and called themselves Catharists or Cathari (the pure). The word is derived from Albigeois (Albigesium), the territory of the viscount of Albi, the chief protector of the sects. The war against the Albigenses arose in consequence of the murder in 1208 of the papal legate Peter of Castelnau. Pope Innocent III. threw the blame on the heretical nobility of southern France, and in particular upon Raymond VI. of Toulouse, and had a crusade preached against them. Raymond averted the blow by submitting to the most humiliating conditions, and the crusading army, under the leadership of the legates Milo and Arnold, marched first against Raymond Roger, the viscount of Albi, Béziers, Carcassonne, and Rasez, whose land was devastated and given to Simon de Montfort. When Béziers, the capital of Roger, was taken by storm, 20,000 of the inhabitants were massacred. The army then (1211) turned against Raymond of Toulouse, who had again been excommunicated. His land was also conquered, and in 1215 adjudged to Simon de Montfort. Raymond, however, supported by his subjects, continued a vigorous resistance to Simon, who in 1218 fell at the siege of Toulouse. A large portion of his territory was then reconquered by Raymond, and his son Raymond VII. even succeeded in forcing Amalric, the son of Simon, to a complete surrender. Louis VIII. of France, who was now prevailed upon by Pope Honorius to take arms against the Albigenses, died in November, 1226; but finally Raymond was compelled in 1229 to purchase relief from excommunication by ceding part of his territory to France, and by making his son-in-law, the brother-in-law of Louis IX. of France, heir to the remainder. Thus the Albigenses were left without a patron, and the inquisition was organized in 1229 by the council of Toulouse to complete their extermination. The name maintained itself, however, throughout the 13th century, not only in France, but also in upper Italy, Spain, and other countries, and disappeared at the beginning of the 14th century. For the doctrine of the Albigenses see CATHARISTS.

ALBINOS, individuals in whom, by some defect in their organization, the substance which gives color to the skin, hair, and eyes is absent. These persons, whether Indian, negro, or white, appear of a uniformly dead, milky hue, with hair of the same shade, and eyes with the iris deficient in the black or blue or hazel pigment, which in others conceals the delicate network of blood vessels, and the intense redness they diffuse over the surface. In the albino, both the pupil and the iris lacking this colored curtain, the former, from the concentration within it of fine blood vessels, is of a deep red, and the circle around it is of a pink color. It is supposed that the dark color of the eye and hair is owing to a large quantity of pigmentum in the system, and light hair and eyes to a smaller proportion of it. The name albino was originally applied by the Portuguese to the white negroes they met with on the coast of Africa. With the features of the negro and the peculiar woolly form of the hair, the color of the skin and hair was white. The eye, instead of the jet-black hue, which seems given to the inhabitants of the tropics to enable them to bear the intense glare of the sun, was like that of the white rabbit and ferret, and, like this, better suited for use in the moonlight and in places sheltered from the light of day. From this inability to bear the light, which, however, is said to be much exaggerated, Linnæus called the albinos nocturnal men. They generally lack the strength of other men; and a peculiar harshness of the skin, such as is noticed in cases of leprosy, would seem to indicate that the phenomenon might result from a diseased organization. They are also deficient in mental capacity. In the same family several children are sometimes born albinos. They are most generally of the male sex. An instance is recorded of a Welsh family, in which every alternate child was an albino. It is stated by Esquirol that two albinos married, and had two children that were not albinos, but of quite brown color. It is not understood to what ultimate cause the phenomenon is to be attributed. It is not limited to man; for individuals possessing the same peculiarities are found among a great variety of the warm-blooded animals, and, according to Geoffroy St. Hilaire, in fishes and some species of molluscous animals as well. Examples are not very rare among the feathered tribe, the effect being seen in the color of the plumage, as in other animals in that of the hair. The white crow and the white blackbird are albinos. Albino mice are not uncommon. The white elephants of India are venerated by the natives, who believe them to be animated with the souls of their ancient kings. One of the kings of the Ashantees is said to have had particular regard for albinos, and collected around him about 100 of them. According to Humboldt, albinos are more common among nations of dark skin, and inhabiting hot climates. In the copper-colored races they are more rare, and still more so among whites.—The knowledge we possess of this subject is derived from the scientific investigations of Blumenbach, De Saussure, who describes them in his *Voyage dans les Alpes*, Buzzi, surgeon to the hospital at Milan, Sömmering, and others.

ALBINUS (Ger. Weiss), **Bernhard Siegfried**, a German anatomist, born in Frankfort-on-the-Oder, Feb. 24, 1697, died in Leyden, Sept. 7, 1770. He was educated by his father, professor of medicine at Frankfort, and afterward at Leyden, and also studied under Winslow and Senac in Paris. At the age of 22 he was called to fill the office of demonstrator at Leyden, then the most celebrated school of medicine in Europe, and two years later became professor of anatomy and surgery. He published *De Ossibus Corporis Humani*, *Historia Musculorum Hominis*, and lastly, *Tabulæ Sceleti et Musculorum Corporis Humani* (fol., Leyden, 1747), illustrated with costly plates prepared under his own inspection. He edited the works of Harvey.

ALBION, the appellation by which Great Britain was originally known to the Greeks and Romans. It is a Celtic word, meaning high island or mountain land, and was probably applied originally to the northern part, embracing the Scottish highlands. The root of the word is thus the same as that of the word Alps. The derivation from the Latin *albus*, white, is now rejected by the best critics.

ALBION, a village, the capital of Orleans co., N. Y., about 40 m. N. E. of Buffalo; pop. in 1870, 3,322. The Erie canal and the Niagara Falls and Suspension Bridge branch of the New York Central railroad pass through it. It has several churches, an academy, a female seminary, two or three banks, and two weekly newspapers.

ALBION, New, a name originally bestowed by Sir Francis Drake on the territory now known as California and the adjacent coast, which he visited in June, 1579, but now restricted by Humboldt and other geographers to that part of the N. W. coast lying between lat. 43° and 48° N.

ALBIRCO, a star in the head of the constellation Cygnus. It is one of the double stars, and has lately attracted the especial attention of spectroscopists by the difference in the lines between its two constituents. The primary star is orange, the smaller blue.

ALBOIN, king of the Lombards, succeeded his father in Pannonia about 560, and died in 574. After aiding Narses against the Ostrogoths, and defeating and slaying Cunimond, king of the Gepidæ, he invaded Italy in 568, overran the peninsula as far as the Tiber, and fixed the Lombard capital at Pavia, which he captured after a three years' siege. He had married his prisoner Rosamond, daughter of Cunimond, and at a feast in Verona forced her to drink out of her father's skull; in revenge for which she caused her paramour Helmichis to assassinate him. The guilty pair then fled to Ravenna, where Rosamond poisoned Helmichis in order that she might marry the exarch Longinus. Her victim discovered the treachery and compelled her to die with him. Alboin, in spite of his barbarity, was a beneficent ruler, and is a favorite hero of German poetry.

ALBONI, Marietta, an Italian contralto singer, born at Cesena, March 10, 1826, or, according to some authorities, at Forli in 1824. Her musical education was completed under Rossini, in Bologna, and she made her début at the Scala theatre in Milan. After singing at Vienna, St. Petersburg, and in various parts of Italy and Germany, she reached London and Paris in the year 1847. Her voice was a true contralto of the sweetest and most sonorous quality, extending from F in the bass to C in alt of the soprano—a compass of 2½ octaves. Her favorite parts were in Rossini's *Gazza Ladra*, *La Donna del Lago*, *Semiramide*, and *Cenerentola*, the florid music of which she executed with marvellous ease. In June, 1852, she arrived in New York on a professional tour, and for upward of a year sang in operas, concerts, and oratorios, in the principal cities of this country. In 1869 she sang in Paris in Rossini's posthumous mass, at a salary of 3,000 francs for each performance; and in March, 1872, she reappeared there in opera.

AL-BORAK, the name of the animal on which Mohammed made his imaginary journeys from the temple at Jerusalem to the celestial regions.

ALBORNOZ, Gil Alvarez Carillo, a Spanish prelate and warrior, born in Cuenca, died in Viterbo, Aug. 24, 1367. As archbishop of Toledo, he took part in the contest with the Moors; and having saved the life of Alfonso XI. in the battle of Algeciras, he was ennobled, and in 1343 commanded in the siege of that place. Falling into disgrace with Alfonso's successor, Pedro the Cruel, he fled to Avignon, where Pope Clement VI. created him cardinal. In 1353 Innocent VI. sent him as legate to Italy, to regain for the papacy the control of Rome; and in the course of the years 1353–'62 he succeeded, under the most unfavorable circumstances, in again subjecting the ecclesiastical states to the papal power.

ALBRECHT, Friedrich Rudolph, archduke of Austria, born Aug. 3, 1817. He is the eldest son of the late archduke Charles, second son of the emperor Leopold II., and is consequently first cousin of the reigning emperor's father. He distinguished himself in his youth as a cavalry commander, and had an important share in the battle of Novara in 1849. He was governor general of Hungary 1851–'60. During the campaign of 1866 he commanded the Austrian forces in Venetia, and gained the brilliant victory of Custozza over the Italians (June 24), but the defeat of Benedek at Sadowa (July 3) neutralized this success. The archduke was called to replace Benedek, but the treaty of Prague immediately put an end to the war. He is a field marshal, and inspector general of the Austrian army. His wife, daughter of King Louis I. of Bavaria, died in 1864.

ALBRECHTSBERGER, Johann Georg, one of the first modern masters of counterpoint, born in the neighborhood of Vienna, Feb. 3, 1736, died in that city, May 7, 1809. He was a pupil of the organist Mann. In 1772 he was made court organist, a member of the academy of music, and in 1792 organist in St. Stephen's church in Vienna. Beethoven and Seyfried were his pupils in counterpoint.

ALBRET, an ancient town and castle of Gascony, in a district of the same name, now included in the arrondissement of Mont-de-Marsan, department of Landes. It gave the title of viscount and afterward of duke to an illustrious family, of whom the most distinguished members were JEAN D'ALBRET, who became king of Navarre in 1494 by marriage with the heiress to the crown, and was dispossessed of the Spanish part of his territory by Ferdinand the Catholic in 1512; HENRI D'ALBRET, his son, king of Navarre, who was taken prisoner at Pavia in 1525; and JEANNE D'ALBRET (see ALBRET, JEANNE D'). The site of the town is now occupied by the hamlet of Labrit.

ALBRET, Jeanne d', queen of Navarre, born in Pau, Jan. 7, 1528, died in Paris, June 9, 1572. She was the only daughter of Henry II. of Navarre and Margaret of Angoulême, sister of Francis I. and wife of Antoine de Bourbon, with whom she succeeded on the death of her father to the sovereignty of Lower Navarre and Béarn. She was equally celebrated for her beauty, her intelligence, and her strength of mind. When Pope Paul IV. invested Philip II. of Spain with the sovereignty of Navarre, she formally embraced Calvinism, toward which she had already shown a leaning, while her husband, a man of weak spirit and ignoble impulses, hastened to submit himself to the church, and accepted from Philip the lieutenant-generalship of the kingdom. He applied to the pope to annul his marriage, but died shortly afterward (1562); and Jeanne, despite the intrigues and menaces of Spain and Rome, retained her possessions. In 1567 she declared Calvinism the established religion of the kingdom. With her children Henry and Catharine, she joined Coligny at La Rochelle with a small band of Huguenots in 1569, and after the assassination of the prince of Condé was regarded as the only remaining support of the Protestants. She is extolled by D'Aubigné and other writers for her influence over the Huguenot soldiery. She reluctantly consented to the marriage arranged by Catharine de' Medici and Charles IX. between her son Henry (afterward Henry IV.) and Margaret of Valois, but died before the realization of her misgivings. She wrote both prose and verse; and some of her sonnets were published by Du Bellay.

ALBUCASIS, Bulcasimes, or, properly, **Abulcasim**, an Arabian physician, born near Córdova, died in that city about 1106. He is known only by his medical work, *Al-Tasrif*, the surgical part of which has been published in Arabic and Latin (2 vols. 4to, Oxford, 1778), and constitutes the most valuable authority upon the surgical science of the Arabs.

ALBUERA, a village of Spain, situated on a river of the same name, in the province and about 12 m. S. S. E. of the town of Badajoz. It was the scene of a battle, May 16, 1811, between Beresford with about 30,000 British, Spanish, and Portuguese troops, who formed the reserve of the army then besieging the French in Badajoz, and Marshal Soult, with 23,000 men, who hoped by defeating the reserve to oblige the British to raise the siege. The attempt was unsuccessful, and the British gained a decisive victory.

ALBUFERA, the name of a lagoon near Valencia, on the E. coast of Spain. It is partly dried up in summer, and a resort for wild fowl, whose capture is a source of revenue. The lagoon, with an estate on its banks, was the domain of Godoy, the prince of the peace. Napoleon created Suchet duke of Albufera, on account of the victory obtained over Blake, and the capture of Valencia, Jan. 9, 1812; and the Spaniards afterward granted the revenues of this district to Wellington.

ALBUMEN (from Lat. *albus*, white, because the albumen of the fowl's egg, on being coagulated by cooking, turns white), an organic substance, more or less fluid in its natural condition, which is coagulated or solidified by the action of heat, alcohol, the mineral acids, and the metallic salts. The characters of albumen were first recognized in the transparent and colorless portion of the contents of the fowl's egg. When an egg is boiled and then opened, it is found to consist of two different portions; namely, an internal portion or yolk, which is yellow, and an external portion, which is white. The external portion before boiling is transparent, semi-fluid, and nearly colorless; and the increased consistency, opacity, and white color which it assumes on cooking, are due to its containing as its principal ingredient the substance in question, which is coagulated under the influence of heat. The composition of albumen of the white of an egg is stated by Dumas to be: carbon, 54·3; hydrogen, 7·1; nitrogen, 15·8; oxygen, 21·0; sulphur, 1·8;—of the serum, or thin part of the blood of man, 0·05 less of carbon, 0·19 more of hydrogen, 0·07 less of nitrogen, and 0·07 less of oxygen. The sulphur in the white of an egg, uniting with hydrogen, forms sulphuretted hydrogen, which tarnishes silver. Albumen is found not only in the egg, but in the blood, in the chyle and lymph, in the interstitial fluid of the muscles, and in the moisture of the serous cavities, as the pericardium and the peritoneum. In the blood, where it is most abundant, it is in the proportion of about 75 parts per thousand; in the lymph and chyle, from 12 to 35 parts per thousand. It is coagulated by a temperature of 160° F., and when in tolerable abundance, as in the serum of the blood, the whole fluid, on boiling, becomes solidified or gelatinous in consistency. The presence of an alkali or an alkaline carbonate, however, in due proportion, will prevent this; and after the albumen is once coagulated, the coagulum may be redissolved by the action of the alkali. In the blood, the albumen is regarded as its most nutritious ingredient, being employed for the nourishment of the various tissues, by which it is absorbed and afterward converted into materials similar to their own. It is not discharged from the body under its own form with the excretions, except in cases of disease, but is retained and employed for the maintenance of the vital operations.—Albumen is regarded as the representative of a large class of organic substances, as well vegetable as animal, which are known as the albuminoid substances. (See ALIMENT.) They are distinguished by the facts that they all contain nitrogen, in addition to carbon, hydrogen, and oxygen; that all those which are fluid or semifluid are coagulable by various means; that they are very ready both to excite and to undergo indirect or catalytic transformations; and that they are all susceptible of putrefaction. They enter very largely into the composition of the food, and constitute its most valuable and nutritious ingredients.—According to recent researches (1865) of Hoppe-Seyler, there is a marked difference between the albumen of eggs and that found in other parts of the animal economy. Vegetable albumen has never yet been prepared in a pure form, and we are unable to say whether it may not constitute a third modification. The two modifications known to chemists at the present time are the soluble and insoluble.

ALBUMINURIA, or **Bright's Disease,** a disease characterized by the presence of albumen in the urine, a more or less general dropsy both of the cellular tissue and the internal cavities, and an organic change in the substance of the kidneys; so called from the name of its discoverer, Dr. Bright. The acute form of the disease sometimes commences with a chill, followed by more or less fever, with a dry skin, furred tongue, and frequent pulse. In other cases the attention of the patient is attracted by the swollen state of his countenance; the swelling rapidly extends and becomes general; at the same time the urine is greatly diminished in quantity, and is of a dark color, looking as if impregnated with smoke, or red, and evidently containing blood. There is more or less dull pain about the loins, with a dry pallid skin, thirst, disinclination for food, often nausea and vomiting. Sometimes, though happily not often, there is complete suppression of urine. In such cases, as a rule, fatal coma quickly supervenes. In the course of the disease, effusions into the cavities of the pericardium, the pleura, or the peritoneum, with or without inflammation of those membranes, are apt to occur; or epileptic convulsions may come on, often ending in fatal coma. The urine has commonly a specific gravity of from 1·015 to 1·025—not varying much from its ordinary standard; when tested by heat and nitric acid, it shows the presence of albumen, sometimes in such large quantity that the whole of the fluid is converted into a jelly-like mass. When examined under the microscope, the sediment deposited by the urine, on standing, is found to consist of blood corpuscles, of renal epithelium, and of small fibrinous casts of the uriniferous tubes, containing entangled in them epithelial cells and blood globules. After the disease has continued some weeks in adults, the epithelial casts, as they are termed, sometimes contain a few oil globules; if the patient recover, these gradually disappear as convalescence comes on. On post-mortem examination the kidneys are found to be enlarged, and gorged with blood. Sometimes their exterior is pale, and this paleness extends through the cortical substance, particularly in the cases which follow scarlet fever. Microscopic examination shows many of the convoluted tubes to be crowded with epithelium, especially in those parts of the cortical substance which appear pale to the naked eye.—Of the causes of acute albuminuria, exposure to cold, particularly when the body is exhausted by fatigue, by recent illness, by an innutritious or unsuitable diet, or by excessive indulgence in alcoholic liquors, is undoubtedly the most important. The actions of the skin and of the kidneys are always to some extent vicarious of each other. When there is free perspiration, the quantity of urine is diminished; in cold weather it is increased. In these cases, however, it is only the watery parts of the excretion which are interfered with; and the kidneys continue to free the blood from the excrementitious matters which it is their peculiar function to separate. When disease follows exposure to cold, it is probable that the sudden checking of the function of the skin produces a vascular congestion of the kidneys, an increased pressure of the blood in their vessels, and thus the appearance of albumen in the urine. Other diseases in which the blood is in an altered condition are occasionally attended or followed by albuminuria; thus repeated instances of its occurrence have been met with in connection with acute rheumatism, typhus fever, erysipelas, and purpura. During the desquamative process in scarlet fever, the patient is liable to acute albuminuria. Accurate observers have found that in most cases albumen can, at some time of the later period of the disease, be discovered in the urine. If at this time the patient be incautiously and unduly exposed to the influence of cold, disease of the kidneys attended by dropsy is apt to follow. The attack differs in no respect except its cause from the acute albuminuria which occurs under other circumstances; it has similar symptoms, and post-mortem examination reveals similar appearances. The strumous diathesis predisposes to the disease; cases of scarlet fever in children of that diathesis have always to be watched most carefully, and from the ordinary causes of albuminuria the strumous suffer in large proportion.—It is easy to understand the pathology of the disease. Not only is the urine diminished in quantity, but what is passed is deficient in urea. The urea which should be eliminated by the urine accumulates in the blood and poisons that fluid. The serum of the blood, of which the albumen is drained off by the kidneys, becomes deficient in that substance, and of lower specific gravity. The pallor of the complexion shows that the blood is deficient in coloring matter; and where the disease has lasted a short time, this is confirmed by direct examination, the blood globules being diminished in proportion. The circulation of a poisoned blood throughout the body causes that liability to secondary diseases which so strikingly characterizes the complaint. While acute albuminuria is always a serious disease, still in a large proportion of cases we can look forward hopefully to the recovery of the patient; yet it must always be borne in mind that at any time secondary disease may be lighted up, which will seriously complicate the case and increase the danger. The existence of the strumous diathesis in a marked degree, or of debility from previous illness, is likewise an exceedingly unfavorable circumstance. The more recent the disease, the better is the prospect of recovery; while the persistent presence of albumen in the urine after a certain time leads us to fear the occurrence of chronic degeneration. The albuminuria following scarlatina generally terminates favorably, and there is no tendency to a return of the disease. When convalescence commences, the urine becomes more copious and pale, and for some time is discharged in large quantity, while the albumen gradually diminishes; but the patient cannot be considered as safe, so long as any trace of albumen can be detected in the urine, or any epithelial casts are discovered under the microscope.—The hygienic treatment of acute albuminuria is sufficiently simple. The patient should be clothed in flannel, and if possible confined to bed; the room should be of a comfortable and equable temperature, and the patient should be most sedulously guarded against exposure to cold currents of air. Throughout the course of the disease, the diet should be unirritating and digestible; any excess in this respect may be attended with bad consequences. When convalescence is established, the preparations of iron will be found exceedingly useful, improving the condition of the blood and the general strength.—*Chronic Albuminuria.* The approach of chronic albuminuria, when not the sequel of an acute attack, is masked and insidious, rarely awaking attention until fatal progress has been made; indeed, persons not suspecting themselves to be ill have in repeated instances died suddenly of what has been supposed to be an apoplectic attack, and post-mortem examination has shown the kidneys and not the brain to be the seat of mischief. In general, however, the symptoms are sufficiently well marked to attract the attention of the observing physician. The patient loses flesh and strength; the appetite fails, or, if good, flatulence and other dyspeptic symptoms are present; after a time the color is lost, and the patient has a pallid, sallow, or waxy look; the skin becomes dry; in the morning, on rising, swelling beneath the eyes is noticed, and at night the ankles are œdematous. There is some pain in the back, but it is not commonly so great as to attract attention. If the patient be questioned, it will be found that there is some irritability of the bladder; he has, contrary to his wont, to rise at night to pass urine, although there is no evidence of disease of the bladder itself. The urine is sometimes passed in large quantities, and occasionally the amount is much below the average; it is pale and of low specific gravity, varying commonly from 1·004 to 1·012. Tested by heat and nitric acid for the presence of albumen, this substance is found to vary greatly in amount in different cases, occasionally being present in large quantity, while sometimes only a trace of its existence is discovered; sometimes it disappears altogether, and will only be discovered after repeated examinations. In the course of the disease dropsy of the abdomen is apt to occur, and this often becomes so great as to be the principal source of suffering. Anasarca is also present, and the whole cellular tissue is infiltrated with serum. As in the acute form of the disease, there may be effusion, with or without inflammation, into the cavities of the pericardium and pleura, as well as into that of the peritoneum. A tendency to prolonged somnolence is often observed, and this may lapse into coma, or may alternate with epileptic convulsions. Bronchitis is apt to occur and to prove severe and intractable; pneumonia, too, sometimes comes on insidiously, and may run on rapidly to a fatal issue; and rheumatism, particularly a chronic and unmanageable form of the disease, is not infrequent. It is to the deteriorated condition of the blood that the number, variety, and fatality of the complications of the disease of the kidneys are to be attributed. The principal alteration in that fluid would seem to be chiefly the diminished amount of the blood globules, the hematine, according to Dr. Christison, sometimes reaching only one third of its natural quantity, and the presence of the retained urea.—The duration of the disease varies very greatly in different cases. Among the laboring classes whose avocations lead them to exposure to the inclemencies of the weather, and in whom sickness brings too often privation of comforts and mental depression, death commonly occurs after no very protracted period; but among those whose position enables them to avoid fatigue and exposure, and who are more on their guard against the first invasion of disease, chronic albuminuria often lasts for years, leaving its victims a very fair measure of the enjoyments and labors of life; their situation, however, is always precarious, and serious or fatal disease may at any moment be brought on by apparently trivial circumstances.—Intemperance in eating and drinking, but especially in the use of fermented and distilled liquors, is the great cause of chronic albuminuria, in cases where it is not consequent upon the acute disease. One form of the disease is so commonly associated with the gouty diathesis, that it has been named by Dr. Todd the gouty kidney; but the same form of disease is often found in those who have never known gout. It occurs most frequently in those of strumous habits, and, at least in hospital cases, it is no uncommon attendant upon consumption. Exposure to cold and wet, fatigue, want, and mental anxiety, may all be put down as occasional causes; yet many cases occur in which we are unable to trace the origin of the complaint.—In the so-called granular degeneration of the kidney, the organs in advanced stages of the disease are very much contracted, so as not to be more than one third or one fourth of their natural size. They have a granular appearance; the capsule is denser and whiter than natural, and is peeled off with difficulty. On cutting open the kidney, the wasting is found to have taken place mainly at the expense of the cortical substance, which is contracted and atrophied, and presents the same granular appearance which is observed upon the surface. In the waxy kidney the organ is enlarged sometimes to twice its natural size. It is of a pale buff color, and presents when cut no trace of granulations; on examination under the microscope the tissue of the organ is found to be filled with an unorganized fibrinous exudation, and the tubes contain a similar deposit, in the form of waxy casts identical with those which microscopic examination detects in the urine. The fatty kidney is enlarged, the surface of the organ is smooth and pale, or more commonly mottled by red vascular patches, and its texture feels softer than natural. On microscopic examination the convoluted tubes are found filled with oil globules.—In chronic albuminuria, where neither dropsy nor other formidable complication demands attention, the treatment consists rather in hygienic measures, in a careful direction of the patient's clothing, diet, and exercise, than in active medication. Flannel should always be worn next the skin, and exposure to wet and cold carefully shunned; all inordinate exercise, whether of mind or body, and all excess of every kind, should be forbidden; the diet should be nutritious, but moderation and regularity must be insisted on; all fermented liquors should be avoided, though, where long habit has rendered their use necessary, the patient may be left to choose the article which best agrees with him.

ALBUQUERQUE, a town and fortress of Spain, in the province and 25 m. N. of Badajoz, and 9 m. from the Portuguese frontier; pop. 7,500. It is the seat of the dukes of Albuquerque, and has a large trade in wool.

ALBUQUERQUE (Port. *Alboquerque*), **Affonso d',** called the Great, and also the Portuguese Mars, one of the first Portuguese conquerors and second viceroy of India, born near Alhandra, in the province of Estremadura, in 1453, died at sea, in the bay of Goa, Dec. 16, 1515. He was brought up at the court of Alfonso V., where his father Gonçalo occupied a distinguished position, and was afterward grand equerry of Kings John II. and Emanuel. He had already seen considerable military service, and distinguished himself both by land and sea, when in 1503 he sailed with his cousin Francisco, in command of a small fleet, to India, by the newly discovered Cape of Good Hope passage. Having rendered important services to the king of Cochin, on the S. W. coast of India, the adventurers gained permission to form a settlement in his dominions, which was the commencement of the Portuguese power in the East. Albuquerque next (1506) accompanied Tristan da Cunha on an expedition to the E. coast of Africa. They carried on a successful warfare for some time against the Arabs and other inhabitants of that coast, until Albuquerque, being left in command of a portion of the fleet by Da Cunha, determined on an attempt against the island of Ormuz, the great entrepot of the commerce between Persia and India. He was at first successful (Sept. 25, 1507), but the Persian commander, rallying his forces, repulsed him and drove him back to his ships. He was now joined by three more vessels, and sailed for India, having received a secret commission to supersede the Portuguese governor, Dom Francisco d'Almeida; but the latter refused to recognize him, and threw him into prison. On the arrival of the grand marshal of Portugal with a large fleet, he was released and installed as governor and commander-in-chief. In an attempt against Calicut the grand marshal was killed and Albuquerque wounded and forced to retreat. He now made his way to Goa, which he seized in the absence of Idal Khan, the ruling Arab prince, on an expedition into the Deccan (Feb. 17, 1510); but his force was too small to retain his conquest, and Idal Khan, having gathered an army, drove him out of the town, and forced him to retire to his ships, which were unable to cross the bar in the face of the monsoon till Aug. 15. In November he returned, stormed the city, and permanently established himself there. The next year, Diego de Vasconcellos having been ordered to lead an expedition against Malacca, Albuquerque seized and sent him back to Portugal, took command of the expedition himself, captured the town with a force of 1,000 against 30,000 natives and 3,000 cannon, and plundered it of an enormous booty. After remaining a year at Malacca, and establishing Portuguese power there, he sailed for Goa, and was shipwrecked on his voyage; but he escaped with life, and on reaching the city repulsed an attempt to recover the place made by Idal Khan. His success struck such terror into the natives, that they submitted and left the Portuguese in peaceable enjoyment of their acquisitions. In pursuance of peremptory orders from home, he now (1513) led an expedition to the Red sea for the purpose of breaking up the commerce between India and Egypt, in order that the Indian trade might be monopolized by Portugal. Repulsed in an attack upon Aden, he returned to Ormuz in 1515, and secured it without a blow, Portugal retaining possession until 1622, when Shah Abbas recovered it. Many attempts had been made by intriguers at home, jealous of his fame, to injure him, and more than one commander had been sent out to supersede him; but he disregarded the orders of the court. He was, however, at length recalled (1515), and his health having suffered in the climate of the Red sea and Persian gulf, his vexation at his disgrace so operated on his enfeebled frame that he sank under it, and died in his 63d year. He was buried at Goa. His loss was deplored as a national calamity, and the king endeavored to atone for his previous ingratitude by honor to his memory after his death. In his personal habits he was moderate, and such was his reputation for justice, that half a century afterward both Mohammedans and Hindoos visited his tomb to pray for his protection against the extortions and oppressions of his successors. The celebrated *Commentarios do grande Affonso d'Alboquerque* was edited from his papers by his natural son Affonso, minister of finance under John III. Of the original edition there are only three copies extant, one of which is in the royal library of Portugal. The best edition was executed at the royal printing office, Lisbon, in 1774 (4 vols. 8vo).

ALBURNUM, that part of the stem of trees which timber merchants call sap wood, in contradistinction to heart wood. It is the newly formed wood, lying next below the bark, and is a delicate fibrous tissue, the principal use of which is to convey the crude sap from the roots to the leaves. It is, therefore, a necessary part of all exogenous trees. But it is of a very perishable nature, and only loses that quality when, being enveloped within exterior layers of the same substance, it becomes combined with other secretions, which solidify it and convert it into duramen, or heart wood. Most plants, and all trees valuable as timber, have the sap wood and heart wood distinct, the one forming the external layer, the other the core. Some, however, consist of alburnum only, and are known as whitewood, which are useless, or of use only for the most temporary purposes.

ALCÆUS, a Greek lyric poet and warrior, a native of Mitylene in the island of Lesbos, flourished toward the close of the 7th century B. C. He served in the war which took place in 606 between the Athenians and Mitylenians for the possession of Sigeum, on the coast of Troas. He was a partisan of the nobles in their feuds with the people of Mitylene, and shared the exile of his faction, after a futile attempt to reëstablish himself in his country by force of arms. His poems, originally consisting of ten books, are said to have exhibited the Æolian lyric in its highest perfection, but only fragments have come down to us. Some were warlike or patriotic; some bacchanalian or erotic songs; while others were hymns, or epigrams, or poems addressed to individual friends. He is considered the inventor of the Alcaic metres. Horace admired and imitated him. The best collection of the extant fragments of Alcæus will be found in Bergk's *Poetæ Lyrici Græci* (Leipsic, 2d edition, 1853.)—There were two other Greek poets of the same name, of Athens and Messene, and of the 3d and 4th centuries B. C., of whose writings some fragments also remain; but they are of little importance.

ALCAIDE, an executive officer among the Spaniards, Portuguese, and Moors, appointed to take charge of a castle or fort, or to superintend a prison. (See ALCALDE.)

ALCALÁ, the name of several towns in Spain, derived from the Moorish *El Khalaat*, the castle. I. **Alcalá de Henares** (anc. *Complutum*), a town on the river Henares, in New Castile, 17 m. E. N. E. of Madrid; pop. about 9,000. It is celebrated for its university, instituted by Cardinal Ximenes in 1510, which was long a famous school of law and divinity, but in 1836 was suppressed, and the library removed to Madrid. The Complutensian polyglot Bible was issued from it at the expense of its illustrious founder. (See POLYGLOT.) It has a military school, a magnificent church, a number of convents, and a palace of the archbishop of Toledo. Alcalá was the birthplace of Cervantes, the historian Antonio Solis, the naturalist Bustamente de la Camera, the emperor Ferdinand I., and many other famous men. It was in possession of the Moors until the 12th century, when it was recovered by Don Bernardo, archbishop of Toledo. II. **Alcalá la Real**, a small town of Andalusia, 27 m. S. S. W. of Jaen, on a plateau 2,804 feet above the sea; pop. about 7,000. It was the scene of a victory by Sebastiani over the Spaniards in January, 1810, which resulted in the capture of Granada by the French.

ALCALDE, in Spanish, the title of a civil dignitary, either judicial or administrative, with which alcaide is sometimes confounded. (See ALCAIDE.) Both terms are probably derived from the Arabic *al-cadi*. The *alcalde mayor* is a local judge who presides over the tribunals, and is distinct from the municipal alcalde or *corregidor*, who is not a lawyer. The *alcalde pedaneo* is a justice of the peace, and is elected by the people. *Alcaldes de casa y corte* form a bench of judges for the trial of criminal or civil causes within certain circuits, to whom an appeal lies against the decision of any individual of their number.

ALCAMENES, a Greek sculptor, flourished in the latter half of the 5th century B. C. He was the most famous pupil of Phidias, and is said to have unsuccessfully competed with him in a statue of Minerva. His masterpiece was a statue of Venus, now lost.

ALCAMO, a city of Sicily, in the province of Trapani, 23 m. S. W. of Palermo; pop. in 1872, 20,890. It was originally a Saracenic town, built on the summit of a neighboring hill. The Saracens were expelled in 1223, and the town was rebuilt at the foot of the hill. It is surrounded by a battlemented wall of the 14th century, but the place is very poor and decayed. In the vicinity are the ruins of ancient Segesta and quarries of yellow marble.

ALCÁNTARA (Arab., the bridge; anc. *Norba Cæsarea*). **I.** A small town in Spanish Estremadura, near the Portuguese frontier, on the left bank of the Tagus, in the province and 34 m. W. N. W. of Cáceres; pop. about 4,500. A magnificent six-arch bridge, built across the Tagus in the reign of Trajan, was blown up by the British during the Peninsular war. **II. Knights of,** a Spanish order deriving their origin from the knights of San Julian de Peyrero, a small body of valiant Christians in the 12th century who vowed continual war against the Moors. In 1215 Alcántara, which had been in possession of the Moors, was recovered by Alfonso IX., and the grand master of Calatrava being unable to undertake its defence, the duty was assigned to the brothers of San Julian, who changed their name to that of knights of Alcántara. In 1495, the grand master dying, Ferdinand the Catholic became administrator of the order, and united the office of grand master with the crown. The order as an organized body has since been abolished, and exists now only as a military order of merit. In addition to the usual vows of the monk-soldier, the knight of Alcántara was bound to maintain the immaculate conception of the Virgin. After 1540 a change was made in the statutes of the order, which permitted the knights to marry.

ALCAVALA, or **Alcabala,** a duty imposed in Spain and its colonies on all transfers of property. It was originally laid in 1341 as an ad valorem tax of 10 per cent., and was afterward increased to 14 per cent. It was even levied on such movable chattels as manufactured commodities, and was attached to all wholesale transactions. This oppressive impediment to the operations of trade continued over the greater part of the Spanish realm until swept away by Napoleon in 1808. Catalonia and Aragon purchased from Philip V. an exemption from the alcavala by the substitution of a tax on rents and on incomes.

ALCAZAR (Arab., the royal castle). **I.** In Spanish, the general name for a castle or citadel—applied to the castles at Seville and Segovia, and to many others. **II. Alcazar de San Juan,** a town of Spain, in New Castile, in the province and 48 m. N. E. of Ciudad Real; pop. about 8,000. It has manufactures of saltpetre, soap, chocolate, &c., and is also a railway centre, where the line from Valencia joins that from Madrid to Córdova. Near it are rich iron pits.

ALCESTIS. See Admetus.

ALCHEMY (Arab. *al-kimia*, from *al*, the, and Gr. *χημεία*, chemistry), the ancient name for the science of chemistry. It is sometimes called the hermetic art, from Hermes Trismegistus, anciently reputed its discoverer. The word alchemy is first found in the works of the Greek author Zosimus of Pannopolis, who wrote in the early part of the 5th century. During the middle ages it was a mysterious art, aiming to change inferior metals into silver and gold, and to find the so-called elixir of life, which was to be the universal remedy for all possible diseases, rejuvenating the old, and even preventing death. From the 10th to the 17th century there was no distinction made between the words chymia or chemistry and alchemy; but since the latter period, this class of researches becoming more positive and scientific, it has been agreed to confine the use of the word chemistry to the positive modern knowledge, and to designate by the term alchemy that imaginary science which sought impossible results from misunderstood or misapplied principles. For this reason the name alchemist has become an expression of contempt. Still the ancient alchemists, who called the subject of their investigation the divine art, were the precursors of our modern science, and enriched posterity with the knowledge of many valuable facts, which laid the foundation of chemistry. The first authentic account of alchemy is found in Suidas, a Byzantine author of the 10th or 11th century, who mentions that the emperor Diocletian, after the conquest of the rebellious Egyptians in the year 296, ordered that all the writings on the chemistry of gold and silver should be burned, in order that the people should not grow too rich by making gold and again commence a rebellion. It appears further that the Greeks living in Egypt in the 5th century were industrious laborers in this field, as a great number of genuine manuscripts on alchemy, dating from the 5th and 6th centuries, are now found in many of the large libraries in Europe, nearly all coming from Alexandria. The Arabs learned this art, after their great invasion of northern Africa and southern Europe, from some of the peoples they conquered. The greatest Arabian author on alchemy, Jaffar or Geber, who lived toward the end of the 8th century in Seville, was enlightened enough not to suppose that any alchemist had ever succeeded in making gold. However, it appears that he did not doubt the possibility of the transmutation of metals, as he believed that all metals were compounds of three elements. With all their errors, however, some of the ancient Arabian authors give very striking definitions of alchemy, such as the science of the balance, the science of weight, the science of combustion. Jaffar, or Geber, marked an epoch in chemical science equal to that of Lavoisier exactly 1,000 years later. In his time no stronger acid was known than concentrated vinegar, and he discovered and described nitric acid and aqua regia, and also discovered that a metal when oxidized (or, as he called it, calcined) increases in weight; a fact rediscovered 1,000 years later by Europeans, and then brought to bear in the destruction of the absurd phlogiston hypothesis then prevailing. He describes the absorption and evolution of gases by and from liquids and solids, and gives singularly clear instructions in regard to filtration, distillation, sublimation, water and sand baths, cupels of bone earth, and various other chemical operations. He made nitric acid by distilling a mixture of blue vitriol, alum, and saltpetre, and aqua regia by adding sal ammoniac to nitric acid; he could then obtain gold in solution, and so solved the great problem to which before his time all the efforts of alchemists had been vainly directed, the manufacture of gold in a potable state. No wonder that Roger Bacon speaks of him as the *magister magisterium*. Rhazes, head physician to the hospital of Bagdad, invented about a century later the preparation of sulphuric acid by the distillation of green vitriol, as Nordhausen vitriol is now prepared. He was also the first to make absolute alcohol by distilling spirits over quicklime. Achild Bechil distilled a mixture of urine, clay, lime, and charcoal, and obtained what he called an artificial carbuncle, as it shone in the dark like the moon; it was phosphorus, rediscovered by Brand in Hamburg in 1669. The taste for this class of pursuits diffused itself over Europe by two channels, the scientific Italians, Germans, Englishmen, and Frenchmen who visited Spain frequently, and the Greeks who fled from the Mussulman invasion. Already in the 10th century we find traces of alchemy in different European countries; but it was most ardently pursued in the 15th, 16th, and 17th centuries, in the course of which many deceptive and imaginary sciences became associated with it, such as theosophy, cabala, chiromancy, necromancy, astrology, and magic. Besides the great number of those honest alchemists who deceived the credulous masses by their own confidence expressed in mysterious and sanguine writings, there was a class of impostors who travelled about extorting money from the credulous. Edward III. of England paid large amounts of money to the celebrated alchemist Raymond Lully, and Henry VI. in 1440 gave several patents for the making of gold. Rudolph II. of Germany founded in Prague a regular alchemistic university. Augustus I. of Saxony himself worked, with his wife Anna as assistant, in the pursuit of gold-making, and kept besides two alchemists on a regular salary. Duke Frederick of Würtemberg, who died in 1608, wasted all the revenue of his land in experiments. Christian IV. of Denmark appointed Harbach, the director of the mint in Copenhagen, as his private alchemist. The emperor Ferdinand III., Duke John Philip of Mentz, and a great many others could be enumerated; and it is strange that notwithstanding numerous glaring deceptions, and revelations of the most contemptible dishonesty, which were often punished by public executions, the belief in the possibility of making gold maintained itself. When Böttger escaped from Berlin in 1703, he was placed in prison in Dresden by the elector of Saxony, to compel him to make gold; he succeeded, however, in discovering there the much more valuable art of making porcelain. Even the celebrated astronomer Tycho Brahe occupied himself with attempts to make gold, but with the purpose of obtaining means to prosecute his astronomical investigations on a larger scale. Until the end of the 17th century all chemical labors were chiefly directed to the same end, though many practised this art for medical purposes. Among the many authors on alchemy must be mentioned Albertus Magnus, Roger Bacon, Arnold de Villanova, Raymond Lully, Basilius Valentinus, Theophrastus Paracelsus, Libavius, Becher, Kunckel, and Glauber.—During the 18th century it is difficult to distinguish between an alchemist and a true chemist, as many really scientific men were kept in error by believing Jaffar's false theory that all metals were compound bodies. Even as late as 1772, Schröder, professor in Marburg, and Wenzel, a distinguished chemist in Freiberg, defended the theory of the transmutation of metals. Guyton de Morveau firmly believed that silver could be changed into gold simply by melting with it sulphuret of antimony and arsenic; but it was afterward discovered that all the gold thus obtained could be accounted for as being present beforehand in the materials used. In 1796 two German physicians in Westphalia founded a society for the purpose of investigating the transmutation of metals; many branch societies were formed, which were flourishing in 1804, and still in existence in 1820. In a text book of chemistry (Baudrimont, *Traité de chimie*) published so lately as 1844, it is stated that a certain "Mr. Javary has obtained very surprising results by following the prescriptions of the ancient alchemists, so that there is hope of at last seeing the great work succeed." In a still later publication (1856) Fiffereau affirms that the metals are compound bodies, and that silver can be changed into gold.—The alchemists' articles of faith were as follows: "1. There exists a preparation, solid in form and red of color, called the philosopher's stone, the grand elixir (*major magisterium*), the red tincture, which, when it is placed in very small doses on melted liquid silver, mercury, lead, or some other common metal, causes a transmutation of the same into gold. 2. The same preparation, used in very small doses as a medicine, cures all diseases, rejuvenates the old, and prolongs life; wherefore it is called the panacea of life, and since it contains the essence of gold, *aurum potabile*. 3. There is another preparation of a white color, called the stone of the second degree, the little elixir (*minor magisterium*), the white tincture, which is equal to the first in half a degree of perfection, and changes the common metals into silver."

ALCIATI, Giovanni Paolo, a theologian, born in Piedmont, died in Dantzic about 1570. He embraced Protestantism, and figured in Geneva, but soon afterward promulgated doctrines about the Trinity which were as distasteful to the Protestants as to the Catholics. He and his fellow laborers, among whom was a physician named Blandrata (see Blandrata), had to flee from Geneva, and chose Poland for a refuge, where they met a hearty reception. He wrote two letters (1564 and 1565) to Gregorio Pauli, maintaining that our Saviour did not exist before his birth of the Virgin Mary.

ALCIBIADES, an Athenian statesman and general, son of Clinias and Dinomache, born in Athens in 450 B. C., died in Bithynia in 404. He boasted his descent from the Telamonian Ajax, and through him from Jupiter himself. His grandfather had been among those who attempted the banishment of the Pisistratidæ, and had received the prize of valor at the battle of Artemisium; and his father fell in the battle of Chæronea (497). Alcibiades was educated in the house of Pericles, his maternal relative, and from a child excelled in all studies and in all physical exercises. As he advanced to manhood, his birth, person, abilities, and wealth, joined to the consideration in which he was held by Pericles, procured for him a crowd of friends and flatterers; and he became as distinguished for the audacity of his dissipations as for the brilliancy of his station and abilities. Socrates, who appreciated his capacities, gained great influence over him, and from this time his whole life seemed a wavering between virtue and vice. He gave the first proofs of his valor in the battle of Potidæa (432), where he was wounded while fighting side by side with Socrates, whose protection alone saved his life. He returned this service to his teacher in the battle of Delium (424), where his efforts saved Socrates from the sword of the conquering Bœotians. He always carried in war a shield inlaid with gold and ivory, and bearing the device of Jupiter hurling a thunderbolt. He distinguished himself in the public festivals of the Greeks, and at the Olympic games he was not content with furnishing one chariot, like the other wealthy young men, but equipped and sent seven, with which he bore off the first three prizes. He took little part in public affairs till the death of the demagogue Cleon, in 422, when he became the head of the new war party in opposition to Nicias. Nicias had just concluded a peace of 50 years between the Athenians and Lacedæmonians, and Alcibiades, jealous of the power of Nicias, set himself to break the peace and to form a union of the Greek states against Sparta. His counsels caused the great expedition to Sicily (415), of which he was appointed commander together with Nicias and Lamachus, and which he thought would be a step toward the conquest of Magna Græcia, Carthage, and Peloponnesus. While the preparations for this expedition were going on, all the busts of Hermes in Athens were during one night mysteriously mutilated. The cause and the authors of this sacrilege were unknown, but the popular fears connected it in some unaccountable way with an attempt to overthrow the Athenian constitution. That Alcibiades had anything to do with the offence there was no evidence, and if he was guilty of it, it was probably one of the unpremeditated results of a nocturnal debauch. Nevertheless, suspicion was thrown upon him, and immediately produced great popular indignation. The Sicilian fleet being nearly ready to sail under his command, he demanded an investigation before his departure from Athens. This his enemies refused to give him, thinking to increase the popular odium against him in his absence. The expedition had hardly reached Sicily when the anger of the people became so excessive that his ruin was fully determined upon. But as he had already gained shining advantages in Sicily, and had become the favorite of the soldiers, it was deemed hazardous to pass public sentence upon him while he was at the head of an army. He was therefore recalled. On his voyage homeward he escaped at Thurii and fled, first to Argos, and then to Sparta. Meantime sentence of death was passed upon him at Athens, and his property was confiscated. In Sparta he adapted himself skilfully to the severe manners of the country, became a favorite of the populace, and, being now the avowed enemy of his own country, he persuaded the Lacedæmonians to send help to Sicily against the Athenians. He then effected an alliance between the Spartans and the king of Persia, for the purpose of supporting the Chians in revolt against Athens. He passed over into Asia Minor, and roused all Ionia into rebellion. Soon, however, his successes and great influence excited the jealousy of the principal Spartans, and Alcibiades took refuge with Tissaphernes, a Persian satrap. He who had won the admiration of the Spartans by adopting all their simplicity, and practising all their austerity, now merited the applauses of the orientals by vying with them in Asiatic luxury. An exile both from Athens and Sparta, he began now to look with longing toward his native country. He persuaded Tissaphernes to desert the cause of the Spartans, and to show willingness even to assist the Athenians, for which service he was recalled from banishment in 411. Though he did not return immediately to Athens, he yet used his influence to make the government aristocratical, and received command of the Athenian fleet at Samos, with the determination not to see again his native land till he had rendered services commensurate with the evils which he had caused it. Defeating the Lacedæmonians both by land and sea, he was suddenly arrested by Tissaphernes, who wished to avoid suspicion of having authorized the enterprise. But finding means to escape, Alcibiades again put himself at the head of the army, defeated the Lacedæmonians and Persians at Cyzicus, captured that town, Chalcedon, and Byzantium, restored to the Athenians their supremacy by sea, and after these brilliant achievements returned to Athens in 407, where he was received with general enthusiasm. His triumph was complete when he celebrated with unusual splendor the Eleusinian mysteries. Being appointed commander-in-chief of all the land and sea forces, he sailed with a fleet to Asia Minor, to reduce some of the Ionian islands and cities. The pay and provisions for his soldiers not arriving, and his position becoming dangerous, he was obliged to leave his army in command of Antiochus, while he himself sought supplies in Caria. During his absence, the Spartan commander Lysander had the art to draw Antiochus into an engagement, in which the Athenians were defeated and a part of their vessels destroyed. Alcibiades now again lost favor. He went into voluntary banishment, to a castle which he had built in Pactye, Thrace. When the Athenian fleet was in 405 lying at Ægospotamos, Alcibiades informed the generals of the perilous position which they had selected, and forewarned them of the fatal result of the battle soon after fought there, which caused the fall of Athens in the following year, and its subjection to the thirty tyrants. The Spartans, who now ruled at Athens, renewed the decree of banishment against him, and Alcibiades fled toward the court of Artaxerxes II. to win over that monarch to the cause of his fallen country. He was on his way thither, in the dominions of the satrap Pharnabazus, when one night his house was surrounded by armed men, and set on fire. He rushed out, sword in hand, but fell pierced with arrows. The Spartans, feeling their supremacy insecure while Alcibiades lived, had probably thus plotted with Pharnabazus for his destruction.

ALCHINDUS. See ALKINDI.

ALCINOUS, in Greek mythology, son of Nausithous and grandson of Neptune. In the story of the Argonauts he is king of the island of Drepane, where he entertained Jason and his companions. In the Odyssey he rules over the Phæaces in the island of Scheria.

ALCIPHRON, a Greek writer, supposed to have been a contemporary of Lucian, flourishing about A. D. 170. He was the author of 118 fictitious letters, in which certain representative characters—fishermen, peasants, parasites, and courtesans—are made to portray, in the purest Attic, the opinions and idiosyncrasies of the classes to which they respectively belong. These letters are mostly given as if written from Athens or its vicinity, in the age immediately following that of Alexander the Great. The best edition of them is that of Seiler (Leipsic, 2d ed., 1856).

ALCIRA, an old walled town of Spain, on an island in the river Jucar, in the province and 24 m. S. of Valencia; pop. about 14,000. It is irregularly built, but is adorned by several churches and bridges over the Jucar, and a fine railway depot belonging to the Valencia and Almansa line. It was an important town in Moorish times.

ALCMÆON. I. In ancient Greek legends, a son of Amphiaraus and Eriphyle of Argos, and brother of Amphilochus. Eriphyle having been bribed by Polynices with the necklace and robe of Harmonia to induce Amphiaraus to join the expedition of the seven against Thebes, the latter, foreseeing that he should fall, charged his sons to kill her when they were grown up. Meantime, an oracle having declared that the expedition of the epigoni would be successful if commanded by Alcmæon, Polynices again bribed Eriphyle with the peplus of Harmonia to persuade him to comply. On his return Alcmæon fulfilled his father's injunction by killing her. For this crime he was afflicted with madness and tormented by the Furies, who drove him into exile, and doomed him to a life of perpetual wandering. Arriving in Psophis, he was hospitably received and purified by its king, Phegeus, who gave him his daughter Arsinoë in marriage. To her Alcmæon presented the necklace and robe of Harmonia. But Psophis having been visited by a famine because of Alcmæon's sojourn there, he had to depart, and, by the advice of an oracle, went to the land of the river god Achelous, where he married the nymph Calirrhoë. His new spouse coveting the magical robe and necklace which he had given to Arsinoë, Alcmæon went to Psophis and obtained them from the daughter of Phegeus, under the pretence that he was going to dedicate them at Delphi. But when Phegeus heard that they had been presented to Calirrhoë, he sent his sons to slay Alcmæon and avenge the insult offered to their sister. Alcmæon was afterward worshipped as a hero in many parts of Greece. II. A Greek natural philosopher, born in the Hellenic city of Crotona in southern Italy, about the middle of the 6th century B. C. He is said to have studied under Pythagoras, and to have been the first who ventured on the practice of dissecting animals. He wrote several medical and philosophical treatises, of which a few fragments remain.

ALCMÆONIDÆ, a noble Athenian family, descendants of Alcmæon, the great-grandson of Nestor. The whole family were expelled from Athens about 596 B. C. by a council of 300 nobles, to whom, by the advice of Solon, they had submitted the case of the archon Megacles, one of their number. Megacles was accused of having been guilty of sacrilege in his treachery toward Cylon and his comrades, whom he killed after promising them safety—a crime which in the opinion of the council brought a stain upon all the Alcmæonids. After an exile of about 30 years they succeeded in returning to the city, and even, after a few years, in seizing the government and expelling Pisistratus. Although Megacles afterward restored him, and gave him his daughter in marriage, new quarrels broke out, and Pisistratus was again banished. Collecting an army, he defeated and again expelled the Alcmæonids. During this period of renewed exile, the family magnificently restored the temple of Apollo at Delphi, which had been burned. Aided by the popularity given them by this great work, and by the friendship of the Spartans, they were in 510 restored for the second time to Athens, where many members of the family became illustrious. Among these were Clisthenes, Pericles, and Alcibiades.

ALCMAN, or **Alcmæon**, a Spartan lyric poet, flourished about 650 B. C. He is said to have been by birth a Lydian, and originally a slave, and to have died at a very advanced age. He wrote chiefly in Spartan Doric. His poems, of which some fine fragments are extant, were mostly erotic.

ALCMENA, in Greek mythology, a daughter of Electryon, king of Mycenæ. She had ten brothers, who, save one, were slain by the sons of Pterelaus. Alcmena had been betrothed to Amphitryon, but she nevertheless declared that the man who avenged the death of her brothers should be her husband. Amphitryon, in order to prove himself worthy of her hand, undertook the enterprise. During his absence, Jupiter visited Alcmena, and by assuming the likeness of Amphitryon, and pretending to have avenged the death of her brothers, obtained her favor. She thus became the mother of Hercules, almost at the same time that she bore Iphicles to Amphitryon. After her death, Jupiter sent Mercury to transport her body to the Elysian isles.

ALCOCK, Sir **Rutherford**, a British diplomatist, born in London in 1809. He was a surgeon in the navy in Portugal in 1833–'4, inspector of hospitals under Sir de Lacy Evans in Spain, in 1835–'7, and auditor of accounts of the English-Spanish legion in 1839–'44. He was afterward consul successively at Foo-Chow, Shanghai, and Canton, China. In 1859 he held the joint offices of consul general and minister in Japan. As a result of his energy in resenting Japanese outrages upon Europeans, attempts were made upon his life in 1860 and 1862. On his return to England he published "The Capital of the Tycoon, or Narrative of Three Years' Residence in Japan" (2 vols., London, 1863). He was made K. C. B. in 1863. From 1865 to 1871 he was envoy extraordinary and minister plenipotentiary and chief superintendent of British commerce in China. He is also the author of "Medical History of the British Legion in Spain" (1838), "Life's Problems" (2d ed., 1862), and other works.

ALCOHOL, in popular language, the intoxicating principle of fermented liquors. The word is of Arabic origin, and means "to paint," probably in reference to the use of this compound to dissolve pigments which are insoluble in water. Chemists understand by alcohol the hydrate of a hydrocarbon radical, and include a numerous class of bodies under this designation. Ordinary vinic alcohol is formed in the decomposition of glucose (grape sugar) by fermentation. One part of grape sugar, represented by the formula $C_6H_{12}O_6$, is split up by a ferment into two parts of alcohol and two parts of carbonic acid: $2(C_2H_6O)+2CO_2$. Hennel so long ago as 1828 (see "Philosophical Transactions") says: "By combining olefiant gas with sulphuric acid, we may form sulpho-vinic acid, from which we may obtain at pleasure, by varying the circumstances of decomposition, either alcohol or ether." This observation has since been confirmed by M. Berthelot, who has succeeded in making alcohol synthetically, by combining water with olefiant gas: $C_2H_4+H_2O=C_2H_6O$. Alcohol for commercial purposes is obtained by distilling wine and other liquors that have undergone vinous fermentation; carbonate of soda is sometimes added to keep back acetic acid, and fusel oil is removed by charcoal. The alcohol of the London Pharmacopœia contains about 82 per cent. of alcohol and 18 of water. Its specific gravity is required to be 0·838, water being 1·000. It is thus seen that the less water it contains, the less is its specific gravity; and this property is therefore a convenient test of its purity. In consequence, however, of condensation of the two fluids when mixed, this test cannot be applied except in connection with tables of reference prepared for this purpose.—To prepare absolute or anhydrous alcohol, some substance must be placed in it which shall retain the water. Fused carbonate of potash is such a substance. It absorbs the water, and the alcohol nearly anhydrous occupies the upper part of the vessel, whence it is distilled off nearly pure. Its specific gravity is now reduced to 0·815, and its percentage of water to about 5. Quicklime, well powdered, and thoroughly mixed and shaken with the alcohol, is sometimes used instead of the carbonate of potash; but chloride of calcium is said by some to be more effective than either. The salt is first fused to free it from water, and is then mixed with an equal weight of the spirit in a well stoppered bottle. When the solution is effected, it is poured into a retort or still, and distilled at a moderate heat. The product of the first half is absolute alcohol. Its specific gravity at a temperature of 60° is 0·794.—Rectified spirit may be deprived of a portion of water merely by being left in a bladder, or in a wide-mouthed bottle tied over with bladder, and kept at a temperature of 105° to 120°. By the principle of exosmose, the water evaporates in part through the membrane. Alcohol has thus been brought from sp. gr. 0·867 to 0·817. Pure alcohol is a colorless fluid, of an agreeable odor and strong pungent taste. It has a great affinity for water, absorbing it from the atmosphere, and increasing in specific gravity with the amount it receives. Mixed with water, heat is at first evolved, showing that a chemical union has taken place; another evidence of which is condensation and diminution of bulk, and greater specific gravity. The greatest heat and condensation result from a mixture of 52·3 per cent. of alcohol and 47·7 of water, the volume after condensation being equal to 96·35. The specific gravity, therefore, of such mixtures can only be determined by experiment.—Diluted with water, alcohol acts as a stimulant, exciting particularly the nervous and vascular systems. In large doses it produces intoxication, and when taken pure acts as a narcotic poison, producing death. It is very inflammable, burning with a pale bluish flame without smoke. The products of its combustion are carbonic acid and water. Absolute alcohol boils at 173° F. The specific gravity of its vapor is 1·6138. Under the exhausted receiver of an air pump it boils at common temperatures. No degree of cold ever yet obtained has effected its congelation. Faraday exposed it to a temperature of 166° F. below zero, which caused it to thicken considerably. It is thus well suited for thermometers for measuring low temperatures.—Alcohol is employed in medicine as a solvent in the preparation of tinctures. It is also a solvent of resins, gums, &c. With the former it makes varnishes; with essential oil, perfumed spirits. The ethers are preparations of it in combination with an acid. It is used with spirits of turpentine to make camphene and the various other illuminating fluids of this class. It is used to preserve anatomical preparations, its effect being to combine with the moisture, and so prevent this from acting upon the animal substance to produce decay. To the chemist it is valuable as a convenient fuel, producing in his lamp much heat with no annoyance from smoke; and it is of frequent use as a reagent for separating salts, one of which is soluble and the other insoluble in it.—The quantity of alcohol in wine, beer, and other fermented liquors, is very variable. Prof. Brande found from 1 to 2 per cent. only in small beer; 4 in porter; from 6 to 9 in ales; about 12 in the light wines of France and Germany; from 19 to 25 in port, sherry, and other strong wines; and from 40 to 50 per cent., and occasionally more, in brandy, gin, and whiskey. The strength of these liquors is ascertained by various expedients; but the process is sometimes complicated by reason of the different ingredients intermixed to color, sweeten, or flavor the liquor, or fraudulently added to alter the specific gravity, or to substitute a cheaper material. Mixtures thus complicated require to be first distilled, before their strength can be ascertained by the usual process of specific gravity. Common modes of judging of the strength are by tasting, observing the size and appearance of the bubbles when shaken, the sinking or floating of olive oil in them, and the appearances they exhibit when burned. If cotton or gunpowder immersed in them is inflamed by their combustion, the spirit is considered pure.—Alcohol is decomposed by passing through a red-hot glass or porcelain tube, into carbonic acid, water, hydrogen, olefiant gas, marsh gas, naphthaline, empyreumatic oil, and charcoal. By electrolysis, on adding potash, hydrogen is given off at the negative pole and aldehyde resin is formed at the positive pole. The product of its combustion in the air is carbonic acid and water. The vapor of alcohol mixed with air explodes by contact with flame or an electric spark. On contact with platinum black it is imperfectly oxidized, forming carbonic acid, water, aldehyde, acetic acid, formic acid, acetal, and a peculiar compound with an excessively pungent odor. Chlorine gas converts alcohol into aldehyde, chloral, chloride of ethyl, and acetate of ethyl. One of these products, chloral, has recently been introduced as a valuable hypnotic medicine. Concentrated chloric acid ignites alcohol; dilute, forms acetic acid. Alcohol unites in definite proportions with several salts, forming crystallizable compounds in which it plays a part analogous to the water of crystallization. The methylated spirit of commerce consists of a mixture of alcohol of specific gravity 0·830 with 10 per cent. of common wood spirit. This addition of wood spirit scarcely interferes with the employment of the spirit as a solvent, though it renders it unfit for use afterward as a stimulant drink.—Alcohol or spirit of wine is the most important member of a group of compounds which manifest a close analogy with each other, both in chemical composition and in the decompositions of which they are susceptible. The general doctrine of alcohols was introduced into science by MM. Dumas and Peligot. These illustrious chemists, in the course of their investigations into the properties of wood spirit, discovered that vinic alcohol was not a unique body, but that in wood spirit was to be found a compound of similar character, which they therefore called methylic alcohol. Subsequently a long list of bodies properly classed under the generic term of alcohols was discovered by European chemists. As these bodies were found to be closely related to each other and to differ by a common multiple CH_2, they were said to be homologous, because a like description is applicable to each member of the series. The following table includes the most important homologous alcohols:

Methylic alcohol		CH_4O
Ethylic	"	C_2H_6O or $CH_4O + (CH_2)$
Propylic	"	C_3H_8O or $CH_4O + 2(CH_2)$
Butylic	"	$C_4H_{10}O$ or $CH_4O + 3(CH_2)$
Amylic	"	$C_5H_{12}O$ or $CH_4O + 4(CH_2)$
Caproic	"	$C_6H_{14}O$ or $CH_4O + 5(CH_2)$
Caprylic	"	$C_8H_{18}O$ or $CH_4O + 7(CH_2)$
Laurylic	"	$C_{12}H_{26}O$ or $CH_4O + 11(CH_2)$
Cetylic	"	$C_{16}H_{34}O$ or $CH_4O + 15(CH_2)$
Cerylic	"	$C_{27}H_{56}O$ or $CH_4O + 26(CH_2)$
Melyssylic	"	$C_{30}H_{62}O$ or $CH_4O + 29(CH_2)$

ALCONA, a N. E. county of Michigan, on Lake Huron; area, 630 sq. m.; pop. in 1870, 696. It is drained by the Ausable and one of its branches. Alcona lake, in the N. part, empties through Thunder Bay river into Thunder bay. In 1870 there were three schools attended by 137 children.

ALCORN, a N. E. county of Mississippi, bordering on Tennessee; pop. in 1870, 10,431, of whom 2,768 were colored. It was organized in 1870 from portions of Tippah and Tishemingo counties, and was named in honor of James L. Alcorn, governor of the state. The Tuscumbia and Hatchie rivers intersect the county, and the Memphis and Charleston and Mobile and Ohio railroads run through it. The productions in 1870 were 11,597 bushels of wheat, 226,057 of corn, 14,892 of sweet potatoes, and 2,546 bales of cotton. Capital, Corinth.

ALCOTT, Amos Bronson, an American educator, born at Wolcott, Conn., Nov. 29, 1799. Like many farmers' sons in Connecticut, while still a boy, he was intrusted by a local trader with a trunk of merchandise, with which he sailed for Norfolk, Va., and which he afterward carried about among the plantations; and his early readings were in the planters' houses, who gave him hospitality, and, observing his turn for study, lent him books. On his return to Connecticut he began to teach, and attracted attention by his success with an infant school. He removed to Boston in 1828, and showed singular skill and sympathy in his methods of teaching young children of five, six, and seven years, at the "Masonic Temple." (See "Record of a School," by E. P. Peabody, 12mo, Boston, 1834; also, a transcript of the colloquies of these children with their teacher, in "Conversations on the Gospels," 2 vols. 12mo, Boston, 1836.) But the school was in advance of public opinion, and was denounced by the newspapers. Mr. Alcott gave up the enterprise and removed to Concord, Mass., where he engaged in study, interesting himself chiefly in natural theology and reform in education, diet, and civil and social institutions. On the invitation of James P. Greaves of London, the friend and fellow laborer of Pestalozzi in Switzerland, Mr. Alcott went to England in 1842. Mr. Greaves died before his arrival, but Alcott was cordially received by his friends, who had given the name of "Alcott House" to their school at Ham, near London. On his return to America, he brought with him two of his English friends, Charles Lane and H. G. Wright; and Mr. Lane having bought a farm which he called "Fruitlands," at Harvard, Mass., they all went there to found a new community. Messrs. Lane and Wright soon returned to England, and the farm was sold. Mr. Alcott removed to Boston, and afterward returned to Concord, and has led the life of a peripatetic philosopher, conversing in cities and in villages, wherever invited, on divinity, on human nature, on ethics, on dietetics, and a wide range of practical questions. These conversations, which were at first casual, gradually assumed a more formal character, the topics being often printed on cards, and the company meeting at a fixed time and place. Mr. Alcott attaches great importance to diet and government of the body; still more to race and complexion. Mr. Alcott contributed several papers entitled "Orphic Sayings" to the "Dial" (Boston, 1839–'42), and in 1868 published a volume entitled "Tablets." His latest work, entitled "Concord Days" (1872), contains his personal reminiscences of that town.—**Louisa May,** an American authoress, daughter of the preceding, born at Germantown, Penn., in 1833. She began to write fairy tales in her teens, and her first volume, "Flower Fables," was published in 1855; it was followed by a number of stories written for the Boston journals. Her "Hospital Sketches" (1863), which won for her a general reputation, were made up from letters written home while she was a volunteer nurse in the army at the south. She became a contributor to the "Atlantic Monthly" in 1863–'4, and in 1865 published her first novel, "Moods." She wrote "Little Women," the most popular perhaps of all her works, in 1867. This was succeeded by "An Old-Fashioned Girl" in 1869, and by "Little Men" in 1871.

ALCOTT, William Alexander, M. D., an American author, cousin of the preceding, born at Wolcott, Conn., Aug. 6, 1798, died at Auburndale, Mass., March 29, 1859. He supported himself until he reached the age of 25 by working on the farm in summer and teaching in winter. Subsequently he studied medicine at Yale college, and after practising about four years he engaged with Mr. Woodbridge, the geographer, in the preparation of school geographies and atlases, and in editing the "Juvenile Rambler," the first weekly periodical for children published in America, and the "Annals of Education." At this time he coöperated actively with Gallaudet, Woodbridge, Hooker, and others, in striving to effect a reform in the public schools of the state. He wrote many articles on this subject for the Hartford and New Haven papers, one of which, "On the Construction of School Houses," gained a premium from the American institute of instruction. In 1832 Dr. Alcott removed to Boston, and published his "Young Man's Guide," which has exerted a great influence in spreading important physiological principles. For more than 20 years he passed his summers in laboring at home with his pen, and his winters in lecturing in different parts of the country, upon the topics which especially occupied his attention. He visited upward of 20,000 schools, before many of which he lectured. He published above 100 books and pamphlets, among which may be specified, in addition to those already mentioned, "The House I Live In," "The Young Woman's Guide," "Young Housekeeper," the "Library of Health" (6 vols.), "Moral Reform," and "My Progress in Error." Dr. Alcott, though the advocate of many opinions which are open to the charge of singularity, was a philanthropist of the genuine stamp, and his name is identified permanently with some of the most valuable reforms in education, morals, and physical training, which the present century has witnessed. The amount of labor which he performed without the expectation of any compensation for his services, is believed to be almost unparalleled. So unintermitting and engrossing were his various avocations, that he hardly ever found time to read a book through; and the books which he wrote probably exceed in number those which he read entirely. Dr. Alcott's views of reform did not lead him to the adoption of any violent and destructive measures. The great object of his labors was to prevent poverty, vice, and crime, by means of correct physical and moral training, and the judicious application of intelligence to the improvement of society.

ALCOY, a town of Spain, in Valencia, in the province and 23 m. N. of Alicante; pop. about 25,000. It is well built, in a picturesque site between two streams, and has extensive manufactures of paper, cloth, linen, and excellent sugar-plums. The best paper for cigarettes is made here.

ALCUIN (Lat. *Flaccus Albinus Alcuinus*), an English scholar and churchman, born probably in York about 735, died May 19, 804. He was master of the school and keeper of the cathedral library at York, until at the invitation of Charlemagne he went to France in 780 and opened a school, probably at Aix-la-Chapelle, where his lessons were attended by the emperor and his court. This establishment is supposed to have been the germ of the university of Paris, and had an important influence upon the revival of learning in France. In 796 he received the abbey of St. Martin of Tours, and soon afterward opened a school there, which became widely celebrated. He was the confidant and adviser of the emperor, and one of the most learned men of the age, but so modest that he refused to accept any higher order in the church than that of deacon. The best edition of his writings, including theological treatises, epistles to Charlemagne, and miscellaneous letters, was published by Froben (2 vols. folio, Ratisbon, 1777).

ALCYONE, the brightest of the star group of the Pleiades, and the supposed centre of the arc in which our sun and planets appear to be moving through the interstellar space.

ALDAN. **I.** A name applied by some geographers to the whole range of mountains in eastern Siberia, from the Altai chain to Behring strait. Others limit its application to a branch of this mountain system, extending from the Yablonnoy range in a northwesterly direction about 900 miles. Mt. Kapitan, the highest summit of this branch, has an elevation of 4,263 feet above the sea level. **II.** A river, which rises in the Aldan mountains, and after a N. and W. course of about 900 miles falls into the Lena, 100 miles N. of Yakutsk.

ALDBOROUGH, a market town and parish of Yorkshire, England, on the Ure, 16 m. W. N. W. of York. The town is a place of great antiquity, supposed to have been the capital of the Brigantes, known to the Romans as Isurium. Several remains of antiquity have been discovered. Three remarkable obelisks of rough stone are in the neighborhood, the highest of which is 30 feet high.

ALDEBARAN, the chief star in the constellation of Taurus, forming the eye, and one of the group of five called the Hyades. Huggins has lately proved by means of the spectroscope that this star has nearly the same chemical composition as our sun, from which other stars differ considerably.

ALDEGONDE, Sainte, Philip van Marnix, baron of, a Dutch statesman and scholar, born in Brussels in 1538, died in Leyden, Dec. 15, 1598. At Geneva, where he was educated, he imbibed from Calvin a strong attachment to the reformed creed, and after his return home he was one of the signers, if not the originator, of the pact of the nobles protesting against the establishment of the inquisition in the Netherlands in 1566. He was the especial friend of William of Orange, who confided to him several delicate missions, and sent him in 1572 to the first assembly of the Dutch states general at Dort. He was also military commandant of several towns, and in 1573–'4 was for some time a prisoner in the hands of the Spaniards. He was afterward sent by the states general as envoy successively to Paris, to London, and to the diet of Worms (1577). In 1584, being burgomaster of Antwerp, he defended the city against the duke of Parma, but was at last obliged to surrender, after which he spent several years in retirement. In 1590 he was ambassador to France. He left several controversial treatises and an excellent metrical version of the Psalms, and at the time of his death was translating the Bible into Flemish.

ALDEGREVER, or **Aldegraf, Heinrich,** a German painter and engraver, born at Paderborn in Westphalia in 1502, died about 1560. He was a pupil and imitator of Albert Dürer. His prints, which are very numerous, are sharp and angular in outline, and generally small.

ALDEHYDE, a liquid obtained from alcohol. Liebig was the first to study the products formed by abstracting hydrogen from alcohol, and to give the name of alcohol dehydrogenated to the first of the series. If vinic alcohol be burned at a low temperature and with a limited supply of air, the vapors emitted have a peculiar irritating effect on the eyes and nose, due to the production of a remarkable body named aldehyde. Similar compounds are furnished by the imperfect combustion of the other alcohols, so that there are as many aldehydes as there are alcohols. There are numerous ways of preparing ordinary aldehyde, among which may be mentioned the oxidation of alcohol by platinum black, chromic acid, nitric acid, chlorine water, and a mixture of sulphuric acid and black oxide of manganese. The method usually employed is to distil 2 parts of 80 per cent. alcohol, 3 parts oil of vitriol, and 2 parts of water into a well cooled receiver. After about 3 parts have passed over, the distillate is mixed with an equal weight of chloride of calcium and further distilled until 1⅓ part has passed over. It is further rectified by mixing 1 volume with 2 volumes of ether surrounded by cold water, and passing ammonia through it to saturation. Crystals of aldehyde-ammonia separate, which are washed with absolute ether and dried; by subsequently distilling these crystals with sulphuric acid and a little water, pure anhydrous aldehyde is obtained. Aldehyde as commonly known is a thin, transparent liquid, with a strong, suffocating odor. It boils at 69·5° F. It dissolves sulphur, iodine, and phosphorus; absorbs dry sulphurous acid; forms definite compounds with the acid sulphites of the alkali metals; and reduces salts of silver. Upon this last property is founded the manufacture of silver mirrors by the reduction of nitrate of silver and the deposition of the metal upon glass.

ALDEN, John, one of the first settlers of Plymouth, New England, was a magistrate in that colony for more than half a century, and died in 1687, aged about 89. On behalf of Miles Standish, Alden once proposed marriage to a pilgrim lady, who replied, "Prithee, John, why do you not speak for yourself?" The query led to John's becoming the lady's husband. This incident has been made the subject of a poem by Longfellow.

ALDENHOVEN, a town in Rhenish Prussia, on the road from Jülich to Aix-la-Chapelle; pop. in 1867, 3,041. It is noted for a victory of the Austrians under the prince of Coburg over a part of the French army under Dumouriez, March 1, 1793, the result of which was the occupation of Belgium by the allies. In October of the following year the vicinity of Aldenhoven again became the scene of considerable fighting between the Austrians and French, under Clairfait and Jourdan respectively, the result being in favor of the republican army.

ALDER (*alnus*), a genus of plants belonging to the natural order *betulaceæ*. It has four stamens, and its fruit is without wings, by which characteristics it is distinguished from the birch, with which it was classed by the earlier botanists. The principal species are found in North America, though some of its varieties are met with on the eastern continent. The common alder (*A. glutinosa*) grows in moist localities, especially on the higher portions of swampy grounds, which are free from standing water. This tree is applied to many valuable purposes of practical utility. Its wood is prized by machinists as adapted to mill wheels and other work which is mostly under water. It is also in request for certain branches of cabinet-making and turnery. The charcoal made from its wood is of an excellent quality, and is highly esteemed for the manufacture of gunpowder. The bark, which contains an astringent juice, is used for tanning, and, with the addition of copperas and other ingredients, forms a dye for several colors. The alder is also an ornamental tree, with its abundant foliage of deep green. The Turkey alder (*A. incana*) is abundant in the north of Europe, and is found to the east, even beyond the Caucasus. It is a taller and more erect tree than the common alder, and possesses many of the same properties, although it grows well in situations that are comparatively free from moisture. A beautiful species, *A. cordifolia*, or heart-leaved alder, is a native of Italy. The alder is easily cultivated, and, although not rapid in growth, can be obtained from seed with a great degree of certainty.

Alder—Catkins and Seed.

ALDERMAN, a title derived from the Saxon *ealdorman* (elder man). The term ealdor was in itself a title of honor, used like the word "elder" in Scripture; but the title ealdorman implied a higher degree of honor, and was among the Saxons applied generally to the chief dignitaries of state and the nobility, and specifically to certain national, county, and municipal officers, whose functions appear to have been chiefly judicial, but are not clearly defined. In modern times the alderman is a legislative and judicial officer of municipal corporations, elected or appointed according to the constitution or charter of the city in which he holds his office.

ALDERNEY (Fr. *Aurigny*), the northernmost of the Channel islands, and the nearest to the French coast, separated from it by the race of Alderney (a strait which is very dangerous in stormy weather), about 7 m. W. of Cape La Hogue, the N. W. extremity of Normandy, and 24 m. W. N. W. of Cherbourg. It is about 4 m. long from N. E. to S. W. and 1½ m. wide; area, 1,962 acres; pop. in 1871, 2,718. There are picturesque cliffs on the S. E. coast, the highest of which is 281 ft. There are several bays, but none safe and capacious enough for large vessels; and the English government has recently erected a granite breakwater off the harbor of St. Anne at a cost of £1,250,000, which, however, has not proved so useful as was anticipated. A series of forts was constructed around the island at the same time; also a railroad along the N. E. coast. St. Anne, the chief town (commonly called the Town), is in a beautiful valley nearly in the centre of the island. The inhabitants principally live by fishing and agriculture. The Alderney cow is small and graceful in form, of dun or tawny color, and remarkable for milking qualities. About 6 m. from Alderney to the west are the Caskets, a cluster of dangerous rocks, on which there are three lighthouses forming a triangle. Upon these rocks Prince William, son of Henry I., with a retinue of above 140 young noblemen, of the principal families of England and Normandy, perished in 1120; and in 1744 the Victory, of 110 guns, with a crew of 1,100 men, was totally lost.—Together with the other Channel islands, Alderney formed a dependency of the Normans, and passed to the crown of England. It is itself a dependency of Guernsey. The civil power of Alderney is, under the peculiar constitution of the Channel islands, vested in a judge appointed by the crown and six jurats chosen by the people for life. These, with 12 douzainiers, also chosen by the people and the governor, form a legislature in which the douzainiers deliberate, but neither they nor the governor may vote. The jurats, with the king's advocate and the greffier or registrar, constitute the court of justice, from which an appeal lies to the royal court at Guernsey, and in the last resort to the king in council. In criminal cases the court at Alderney is only a preliminary tribunal, the court at Guernsey having the final determination of the cause.

ALDERSHOTT, an English military camp of instruction, in Hampshire, 50 m. by rail S. W. from London, established in 1854–'5 on Aldershott common, a broad tract of sandy land. Near the site of the old village of Aldershott an entirely new town has sprung up, and the population of the parish has increased from about 900 in 1852 to over 20,000 in 1872, chiefly soldiers and persons connected with the military and civil services. A broad military road separates the town from the camp, which consists of N. and S. sections, divided by the Basingstoke canal, extending over an area of seven square miles, with accommodation for at least 20,000 soldiers. The structures consist of long rows of wooden huts for the soldiers permanently stationed there, around which they cultivate gardens; the headquarters, a substantial brick building; several churches, a permanent barracks, hospitals, places of recreation, &c. The cost of establishing this national military depot has already considerably exceeded £1,000,000. During the last five years annual reviews have taken place here between the months of June and September; two or more regiments of the volunteer forces being detailed, in their turn, to coöperate with the regulars, and thus gain a practical knowledge of military duty in the camp and on the field.

ALDHELM, an English divine and writer during the Saxon heptarchy, born about 656, died in 709. He was a relative of the king of the West Saxons. He is said to have been the first Englishman who wrote Latin poetry. About 685 he became the first abbot of Malmesbury, and in 705 the first bishop of Sherborne (afterward the bishopric of Salisbury). He is chiefly known by his two works *De Virginitate*, in prose (published by Wharton, 1693), and *De Laude Virginum*, in verse.

ALDINE EDITIONS, works which proceeded from the press of the Manutii (Aldus the Elder, Paulus, and Aldus the Younger), a celebrated family of printers in Venice during the 15th and 16th centuries. (See MANUTIUS.) The Aldine editions comprise the ancient classics, and the works of Petrarch, Boccaccio, Dante, and others. The editions of the senior Aldus, who founded the business in 1490, are the most esteemed. Spurious works with the imprint of the Aldi are by no means uncommon, as they were counterfeited even in their own time, and very extensively at later periods. The great perfection which has been attained in the art of printing, and the attention which has been given, especially during the present century, to the reprint of the classics, have considerably diminished the real value of the Aldine editions, although rare specimens are still much sought for by collectors. The library of the late archduke of Tuscany contains, it is believed, the most perfect collection of Aldine works; but they are met with in most of the great libraries, as the Bodleian at Oxford, the national library at Paris, and the British museum. A. A. Renouard made a complete collection and published a catalogue of them in his *Annales de l'imprimerie des Aldes* (Paris, 1803 and 1834).

ALDINI. I. Antonio, count, an Italian statesman, born in Bologna in 1756, died in Pavia, Oct. 5, 1826. When Bologna in 1797 was wrested by General Bonaparte from the papal government, Aldini, who was then professor of jurisprudence, was sent to Paris by his fellow citizens. He was chosen president of the council of the ancients in the Cisalpine republic, and was held in much esteem by Napoleon, who in 1805 created him a count, and made him a minister of state for the kingdom of Italy. After the fall of Napoleon and the reëstablishment of the former rulers in Italy, he resided in Lombardy. **II. Giovanni**, brother of the preceding, and nephew of Galvani, born in Bologna, April 10, 1762, died in Milan, Jan. 17, 1834. He was professor of natural philosophy at Bologna, Italian counsellor of state, and knight of the order of the iron crown. He is well known by his works (written in Italian, French, and English) on the practical applications of galvanism, illumination, tides, means of safety from fire, &c. He prepared a scheme for turning to profit the rise and fall of the tide in the lagoons of Venice in working mills; and is also said to have been the inventor of articles of fire-proof clothing.

ALDOBRANDINI, a noble family of Florence in the 16th and 17th centuries. SILVESTRO, a celebrated jurist, was born at Florence in 1499, and died in Rome in 1558. Being opposed to the duke Alexander de' Medici, he was banished from Florence in 1530. Of his three sons, GIOVANNI was auditor rotæ and cardinal, and is also known as an author; IPPOLITO became pope under the title of Clement VIII.; and TOMMASO, born at Rome about 1540, was papal secretary of briefs, and left a translation of the "Lives of the Philosophers" by Diogenes Laërtius, and a commentary on Aristotle, *De Physico Auditu.* CINZIO PASSERO, who died at the beginning of the 17th century, was the son of Silvestro's daughter, took the name of Aldobrandini, and was made cardinal. He was a friend of Tasso, who dedicated to him the *Gerusalemme conquistata.* His brother PIETRO was also a cardinal, and legate in France, where he composed the differences between Henry IV. and the duke of Savoy in 1601. The family disappeared in 1681.

ALDRICH, Thomas Bailey, an American poet, born in Portsmouth, N. H., in 1836. After commencing a course of study preparatory to entering college, upon the death of his father he abandoned this purpose to enter the counting room of an uncle, a merchant in New York. Here he remained three years; and it was during this period that he began to contribute verses to the New York journals. A collection of his poems was published in New York in 1855, the volume taking its name from the initial piece, "The Bells." Mr. Aldrich's most successful poem, "Babie Bell," which was published in 1856, was copied and repeated all over the country; and perhaps it was the favor with which it was received that induced him to abandon mercantile pursuits for a literary career. He became a frequent contributor to "Putnam's Magazine," the "Knickerbocker," and the weekly newspapers, for one of which he wrote "Daisy's Necklace, and What Came of It," a prose poem which was afterward issued in a volume, and attained a wide popularity. In 1856 Mr. Aldrich joined the staff of the "Home Journal," which was then under the charge of N. P. Willis and George P. Morris, and continued in this position for three years. His pen was always busy during this period, and many of its products became popular favorites. The volumes published by him since 1855 are: "The Ballad of Babie Bell and other Poems" (1856); "The Course of True Love never did Run Smooth" (1858); "Pampinea and other Poems" (1861); "Out of his Head, a Romance in Prose" (1862); a collection of poems (1863); and a volume of poems published in Boston in 1865. Among his later works is "The Story of a Bad Boy," which is to some degree autobiographical. This attracted wide attention as a serial in "Our Young Folks," and was issued in book form in 1870. Mr. Aldrich has been chief editor of "Every Saturday" from its foundation, and has also made occasional prose contributions to the "Atlantic Monthly" and other magazines.

ALDRIDGE, Ira, called the African Roscius, an American actor, born at Bellair, near Baltimore, Md., about 1810, died in Poland, Aug. 7, 1867. He was a mulatto, whose real name is said to have been Hewlett, and in his youth was apprenticed to a ship carpenter. From association with the German population, which is very large on the western shore of Maryland, he learned to speak the German language familiarly, and he also picked up a fair education. When Edmund Kean was in the United States, after the troubles which occurred during 1826 in consequence of the Cox difficulties, Aldridge became his personal attendant, and is said to have accompanied him to England, where a natural talent for the stage was cultivated. He returned to the United States after a short absence, and some time subsequent to 1830 appeared in Baltimore, at a theatre then known as the Mud theatre, which subsequently belonged to Junius Brutus Booth, the tragedian. He appears not to have been successful. There is no account of his having appeared in any other city in America, whence after a short time he returned to England. He began his career in some of the minor theatres of London, and afterward performed in Ireland (with Kean) and all over Europe, being greatly admired, especially in Germany, in Shakespearian characters. In 1861 he created a sensation at Versailles by his personification of Othello in English, the rest of the company speaking French. He was making a journey to Russia when he died. He married a white woman, but his domestic life was unhappy.

ALDROVANDUS, Ulysses (Ital. *Ulisse Aldrovandi*), an Italian naturalist, born at Bologna, Sept. 11, 1522, died Nov. 10, 1607. He took his degree in medicine in 1553, was made lecturer on natural history, and in 1568 persuaded the senate of Bologna to establish a botanic garden. He investigated meanwhile the phenomena of the external world with indefatigable zeal, making journeys and employing collectors. He published works (in Latin) on birds, on insects, and on the lower animals, and after his death the profusion of materials which he had brought together was arranged in additional volumes.

ALE. See BEER, and BREWING.

ALEANDRO, Girolamo, an Italian prelate and scholar, born Feb. 13, 1480, died Jan. 31, 1542. He was early distinguished for great and varied learning, and was associated with Aldus Manutius and Erasmus at Venice. In 1508 Louis XII. called him to Paris, where he became rector of the university. He was afterward chancellor of the bishopric of Liège, in 1517 librarian of the Vatican at Rome, and in 1520 papal envoy to Germany to oppose Luther's heresy, which he did especially at the diet of Worms in the following year. Clement VII. made him archbishop of Brindisi and papal nuncio in France, and in company with Francis I. he was taken prisoner at Pavia in 1525, and ransomed. In 1531 he was again papal nuncio in Germany, and afterward in Venice, and in 1538 he was made cardinal. Of his numerous writings none were published but a Greek-Latin lexicon, an abridged Greek grammar, and a short Latin poem.

ALECTO, in Greek mythology, one of the Eumenides or Furies. (See EUMENIDES.)

ALEGAMBE, Philippe, a Belgian Jesuit, born in Brussels, Jan. 22, 1592, died in Rome, Sept. 6, 1652. He taught philosophy at the college of Gratz, but finally settled at Rome, where he became superior of the house of the Jesuits, and secretary to the general of the order. Alegambe continued and improved the *Bibliotheca Scriptorum Societatis Jesu*, begun by Ribadeneira and completed by Nathaniel Sotwell. He also wrote two biographical works on Jesuit martyrs to their faith and to their zeal in works of charity, and a life of Cardan.

ALEMAN, Mateo, a Spanish novelist, born in Seville about the middle of the 16th century, died probably in Mexico. In 1568 he was commissioner of finance in his native land, but being falsely accused of maladministration, he was removed from public service, and suffered a long imprisonment. He then betook himself to literature. The first volume of a humorous romance, entitled *La vida y hechos del picaro Guzman de Alfarache*, which he published in 1599, passed through 26 editions within the following six years, besides being translated into the French and Italian. A continuation appeared in 1603, which Aleman repudiated; and the genuine second part was published in Valencia in 1605, but the work was never completed. Aleman afterward went to Mexico, but of his subsequent career nothing is known.

ALEMANNI, or **Alamanni** (Ger., all men), a confederacy of warlike German tribes, with whom the Romans first came into collision in the reign of Caracalla. They then dwelt on the Main, and subsequently spread toward the Danube, the Helvetian Alps, and across the Rhine into eastern Gaul. The Tencteri and Usipetes, who previously inhabited the territories of modern Westphalia, are supposed to have formed the nucleus of the confederation. Caracalla made an unsuccessful campaign against the Alemanni in 214, and boastfully assumed the surname Alemannicus. Alexander Severus and Maximin also fought against them, without impairing their growing power. During the joint reign of Valerian and his son Gallienus they crossed the Rhætian Alps, invaded Cisalpine Gaul, and advanced as far as Ravenna, but were repulsed, and subsequently suffered greater defeats at the hands of the emperors Aurelian and Probus. In the 4th century they made constant inroads into Gaul, but were chastised by Constantius Chlorus, Julian, Valentinian I., and Gratian; in spite of which, however, their power continued to increase. They were at that period united with the Suevi, a kindred nation, with whom they gradually became more and more confounded, until both nations were subdued by the Franks under Clovis. The northern portions of the Alemannic territories remained a domain of the Frankish kings; the rest was afterward formed into a Germanic duchy of Alemannia, between the Alps, the Jura, the Vosges, the Neckar, and the Lech, the eastern part of which finally assumed the name of Swabia (Suevia). The Swabian dialect of the German language is known as the Alemannic.

ALEMBERT, Jean le Rond d', a French mathematician and man of letters, born in Paris, Nov. 16, 1717, died there, Oct. 29, 1783. He was the illegitimate child of the poet Destouches, commissary of artillery, and Madame de Tencin, a court lady, more celebrated for wit and beauty than for virtue. The infant, exposed on the steps of the church of St. Jean le Rond, was picked up by the police, and given to a glazier's wife, to whose affection the great philosopher responded throughout his life. He lived with her for 40 years, and when in the days of his fame Madame de Tencin came forward and avowed her relationship, he repudiated her, alleging that she was but a stepmother, and the glazier's wife his real parent. Soon after his discovery his father acknowledged him and settled upon him a pension of 1,200 francs, which was sufficient to provide for his education. In 1721 he was sent to a boarding school. At the age of 12 he was transferred to the Mazarin college of Paris. His philosophical studies here were eminently successful. He was for some time restrained from the study of mathematics, and applied himself to law, which he soon abandoned for medicine; but the irrepressible bent of his mind overcame all obstacles, and he at last betook himself with renewed ardor to his favorite employments. A memoir and some remarks on the *Analyse démontrée* of Reyneau procured him the membership of the academy of sciences in 1741. His celebrated *Traité de dynamique* appeared in 1743, and created a new branch of science. In 1744 he published his *Traité de l'équilibre et du mouvement des fluides*. In 1746, the Berlin academy of sciences having proposed the general causes of the winds as the subject for the prize essay, D'Alembert's treatise gained him the prize and the membership of the academy; in this he attributed the currents to the combined influence of the sun and moon in creating an action resembling the flux and reflux of the tides. In 1754 he became a member of the French academy, and in 1772 its perpetual secretary, and within the next three years wrote historical eulogies upon 70 members deceased since 1700, which were published in 6 vols. 12mo. He was early connected with the freethinkers of his age in the preparation of the *Encyclopédie*, and his *Discours préliminaire* was designated by his associate editor Condorcet as a production of which only one or two men in a century could be found capable. The progress of the work was interrupted by the government at the end of the second volume, at which time

D'Alembert finally withdrew from the editorship, but continued to write the mathematical articles. He was a member of most of the learned societies of Europe, and was in intimate personal communication with Frederick the Great, who invited him to reside at the court of Berlin. This, however, he declined. The empress Catharine offered him the post of tutor or governor to the cezarevitch, with an income of 100,000 livres, but this he also declined. He was a man of singularly independent mind and manners, without degenerating into discourtesy or indifference to the feelings or necessities of others. His connection with the *Encyclopédie* involved him unjustly in the general censure which attached itself to the impiety and intolerance of many of its contributors. D'Alembert's means were limited and insufficient to keep pace with his benevolence; for when only in the enjoyment of two pensions of about $500 a year, one from Frederick, and the other from his own country, he gave away more than half their amount in charity. His grief on the death of Mlle. de l'Espinasse, for whom he entertained a strong attachment, which she requited with less ardent sentiments, is believed to have hastened his death. Among his works not already mentioned are: *Recherches sur différents points importants du système du monde* (3 vols. 4to, 1754–'6); *Opuscules mathématiques* (8 vols. 4to, 1761–'80), a rich mine of original materials; *Éléments de musique*, upon the system of Rameau; *Mélanges de littérature et de philosophie* (5 vols. 12mo); *Sur la destruction des Jésuites en France;* and a life of Queen Christina of Sweden. No single collection of his mathematical works has been published, but Bastien collected his literary and philosophical writings in 18 vols., with a full life of the author prefixed (Paris, 1805). A more complete edition was published by Bossange in 5 vols. 8vo (1821), containing several pieces not before published, and the correspondence of D'Alembert with Voltaire and Frederick II.

ALEMBIC (Arab. *al*, the, and Gr. ἀμβιξ, a cup), one of the oldest forms of vessels used for distillation, and the type of all later kinds of apparatus for the same purpose. It consists of a vessel in the form of a flask with wide neck, on which is fitted a head connected with a downward running tube, the whole so arranged that all vapors condensed against the inside of the head run through a surrounding gutter to the tube and so into a receiver. Our engraving represents a glass alembic on a stand, heated by a spirit lamp, and connected with the receiver, which is supported on a separate stand. Notwithstanding this apparatus is at present little used in its original shape, and is superseded by the retort, it must be confessed that it has its advantages, and was especially adapted for the class of researches with which the alchemists occupied themselves. These advantages are that the head can be separated from the body, which is very convenient for the introduction of solid or semi-fluid substances, and also for cleaning out after the operation. In some manufacturing processes alembics are still employed, as in that of hydrocyanic acid. In France they are still more employed than elsewhere; but it must not be forgotten that the French call nearly all kinds of distilling arrangements alembics, so that many of their so-called alembics are very different from the apparatus here described.

ALEMTEJO, the largest province of Portugal, bounded by Estremadura, Beira, Spain, Algarve, and the Atlantic ocean; area, 9,416 sq. m.; pop. in 1868, 332,237. The surface on the E. is traversed by irregular chains and groups of hills, which in the western section almost entirely disappear. On the southern border the Algarvian chain rises to the height of 4,000 feet. The principal rivers are the Guadiana, Tagus, and Sadão. The climate on the barren plains of the S. and W. is hot and dry. In the E. it is more salubrious and the soil more fertile, yielding good crops of wheat, barley, rice, and maize. The vine is universally cultivated. The citron, lemon, figs, and pomegranates abound. Attention is paid to the breeding of sheep, hogs, and goats. In a few places there are manufactures of woollen cloths and of earthenware. Alemtejo is divided into the three districts of Portalegre, Evora, and Beja, so called after their chief towns. Capital, Evora.

ALENÇON, a town of France, in Normandy, capital of the department of Orne, on the Sarthe, 116 m. W. S. W. of Paris; pop. in 1866, 16,116. It has a considerable inland trade, and is known for the famous lace, *point d'Alençon*. The fabrication of this costly article, however, now gives employment to a comparatively small number of families, in which it is an hereditary occupation. The trade was one of the forced productions of Colbert, who gave a monopoly of it for ten years, and a bounty from the crown. The inhabitants are generally engaged in making muslin, embroidery, leather, glass, and iron. Alençon is mostly built of granite, and has a cathedral, library, museum, college, theatre, and annual horse races. Its counts were conspicuous in the history of Normandy and of France from the 10th century. In 1219 it was made an apanage of the French crown, with lords of the royal family; and in the 15th century it was erected into a royal duchy. The second son of the duke de Nemours, born in 1844, now bears the title of duke d'Alençon.

ALENÇON, François, duke of. See ANJOU.

ALEPPO (Arab. *Haleb;* anc. *Chalybon*, afterward *Beræa*), a city of N. Syria, capital of a Turkish vilayet of the same name, in lat. 36°

11′ N., lon. 37° 10′ E., on the borders of the Syro-Arabian desert, about 60 m. E. of Antioch and 70 m. from the Mediterranean. The population, formerly estimated at upward of 200,000, has been reduced by earthquakes, and now numbers about 100,000, including 16,000 Christians and 4,000 Jews; the rest being Greeks, Armenians, Arabs, and Turks. The city is encompassed by low and barren hills and irregular mounds, intersected by fertile valleys. The gloomy aspect of the projecting chalk rocks is relieved by gardens along the rivulet Nahr Kowaik, planted with the celebrated pistachio trees and abounding in exquisite fruits and flowers. Including the straggling suburb, the circumference of Aleppo is 5 to 6 m., but the city proper is not over 3 m. in circuit, and it is shut in by a ruinous Saracenic wall. Aleppo is a city of a thoroughly oriental type, with extensive bazaars, numerous mosques, and a population remarkable for its elegant bearing. The streets are better than those of most eastern cities, though many of them are arched over. The houses are of stone, substantially built, with terraces for evening promenades. The commerce, though considerably less than formerly, is still active, the value of the imports in 1866, chiefly English, being $6,500,000, and of the exports, $2,700,000. The trade in Aleppo brocades and silks has declined since the introduction of European silks. The principal exports are wool, cotton, pistachio nuts, oil, cereals, &c. Aleppo, being on the only safe route between Syria and eastern Asia, is the great centre of the Damascus and Bagdad caravans. —The name of Haleb is traced by some Arab philologists of the 14th century to the days of Abraham, who, according to this tradition, stopped there on his way to Canaan, distributing milk to the poor and repeating the words *Ibrahim aleb*, "Abraham has milked." In 638 Aleppo was taken from the Byzantine empire by the Arabs and made the seat of a sultanate. It was reconquered by John Zimisces, and afterward became the capital of the Seljuk Turks. After being besieged by the crusaders, desolated by the followers of Timour, oppressed by the Mamelukes of Egypt, and destroyed several times by earthquakes, it became, after the Turkish conquest at the beginning of the 16th century, a prosperous city, and the seat of a branch of the Levant company. In 1850 it was the scene of massacres of Christians, and of revolts, which were suppressed in November with the aid of Generals Bem and Guyon, then in Turkish service. Prelates of the Roman Catholic, Greek, Armenian, and Syriac churches, and consuls of the principal Christian nations, reside here. The place has been often visited by the plague and the cholera.—A disease of the skin called the Aleppo button (Arab. *hebbet*), or boil, attacks most of the residents, and is attributed to the unwholesome water. The natives generally have it in infancy, and chiefly in the face. The eruption makes its appearance in the form of a small, hard, red tubercle, increasing in size after several weeks, discharging pus, and eventually forming a scab, which on disappearing leaves an indelible mark. Dogs and cats are commonly attacked by it in the nose. Strangers are attacked sometimes soon after their arrival, sometimes not until years after their departure. The malady, which usually lasts a year, prevails all along the adjacent rivers, and along the valley of the Euphrates, as far as Bagdad.

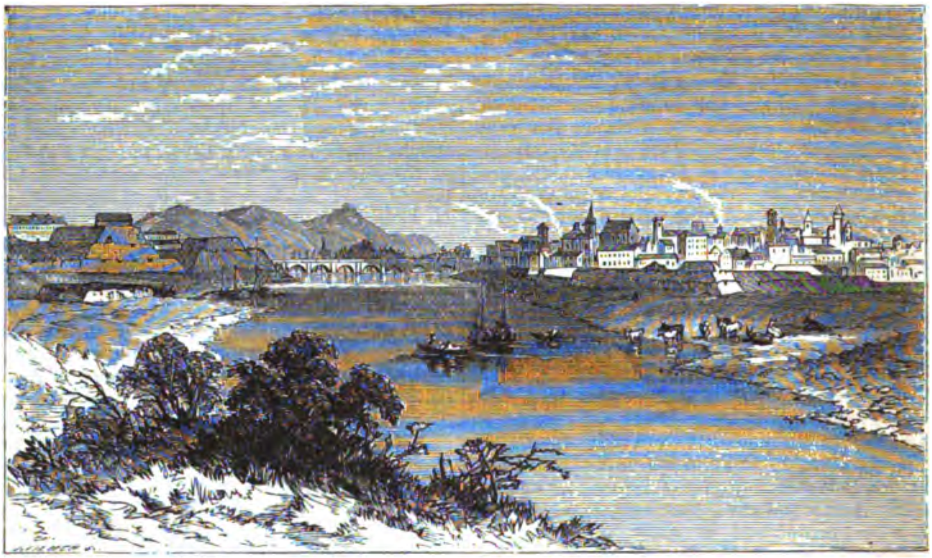
ALESHKI (formerly *Dnieprovsk*), a town in S. Russia, in the government of Taurida, on an arm of the Dnieper, 5 m. S. E. of Kherson; pop. in 1870, 8,484, and rapidly increasing.

ALESIA, a fortified town of the Mandubii, in Celtic Gaul, renowned for its siege by Cæsar in 52 B. C. It was a very old town, built on a high hill, washed by the Lutosa and Osera (believed to be the Oze and Ozeraine, in Côte d'Or), near the sources of the Sequana (Seine). Its fall, and the surrender of Vercingetorix, who defended it, decided the subjugation of Gaul. It was destroyed by Cæsar, but was subsequently rebuilt, and became a very considerable city under the Romans. It was ruined by the Normans in the 9th century. At the foot of the hill (Mont Auxois) now stands the village of Alise Ste. Reine, 6 m. S. of Montbard.—M. Delacroix, an architect of Besançon, called attention in 1855 to the village of Alaise, near Ornans, in the department of Doubs, as the site of the battlefield of Alesia. Excavations were made at Alaise and at Alise, at the latter place under the auspices of Napoleon III., and archæological evidence was produced in support of the two localities, that respecting Alise Ste. Reine being regarded as conclusive in favor of this site by F. de Saulcy and other competent persons who conducted the researches there in 1861. Many works have been written on this controversy. The most important publications in behalf of Alaise are four by J. É. J. Quicherat (Paris, 1857-'62); in favor of Alise, by Rossignol (Dijon, 1856), the duke d'Aumale (Paris, 1858), and F. de Saulcy (1862). The academy of inscriptions and belles-lettres conferred a prize upon Rossignol's essay. In 1862 M. Gravot published his opinion that the battle of Alesia was fought neither at Alise Ste. Reine nor at Alaise, but at Alise-Izernore, in the department of Ain.

ALESSANDRESKU, Gregory, a Roumanian poet, born at Tergovist, Wallachia, about 1812. After a short service in the army, he became conspicuous as a liberal politician, and was banished to a monastery for publishing satires and fables reflecting upon the government. In 1859 he was for a short time minister of finance. A second edition of his most important work, entitled "Reminiscences, Impressions, Letters, and Fables," was published at Bucharest in 1863.

ALESSANDRI, Basil, a Roumanian poet of Venetian origin, born in Moldavia in 1821. He was educated at Jassy and Paris, joined the party of young Roumania, and produced ballads and plays which are popular in Moldo-Wallachia. His principal works have been published at Jassy, Bucharest, and Paris (1852–'63). After the death of his father he emancipated all his serfs, and his example was followed by nearly 1,000 other serf-holders previous to the act of general emancipation promulgated by Prince Gregory Ghika. In 1859–'60 he was minister of foreign affairs. He published in French a collection of *Ballades et chants populaires de la Roumanie* (Paris, 1855).

ALESSANDRIA. I. A N. W. province of Italy, in Piedmont, embracing the former duchy of Montferrat; area, 1,952 sq. m.; pop. in 1872, 683,473. It is traversed E. and W. by the Turin and Stradella, and N. and S. by the Genoa and Lago Maggiore railroad. The principal rivers flowing through it are the Tanaro, Bormida, and Scrivia. Among the chief products are maize, wine, silk, madder, and flax. The eastern part is an extensive, fertile plain; the centre consists partly of barren hills, and partly of excellent table land; the western portion is hilly, and produces the best wine of Piedmont. It is divided into the districts of Tortona, Alessandria, Asti, Casale, Acqui, and Novi. II. A fortified city (Ital. *Alessandria della Paglia*, of the straw, from its houses having originally been thatched), capital of the above province, near the confluence of the Bormida and Tanaro, a few miles from the Po, and 46 m. E. S. E. of Turin; pop. in 1872, including suburbs, 57,079. It was founded in 1168 by the Lombard league, as a bulwark against the German emperors, and in modern times again received significance as a national Italian fortress against Austria. Though up to the beginning of this century its defences were indifferent, the French in vain besieged it in 1657, and Prince Eugene of Savoy in 1707 only took it after a protracted defence. Napoleon I. strengthened it, after the annexation of Piedmont to France, with casemated batteries for the defence of the ditch, great additions to the citadel, and a bridge-head on the opposite side of the Bormida. It is now the strongest fortified city of Italy, after Verona. During the war of 1848–'9 it was the principal arsenal of the Italians, and after the battle of Novara it was temporarily occupied by an Austrian force during the truce. It was the headquarters of Napoleon III. and Victor Emanuel in the campaign of 1859. The city has a college, a theological seminary, about 20 churches, including a cathedral, an academy of science and arts, several palaces, and manufactories of linen, silks, cloths, and wax candles. It is an important railway centre.



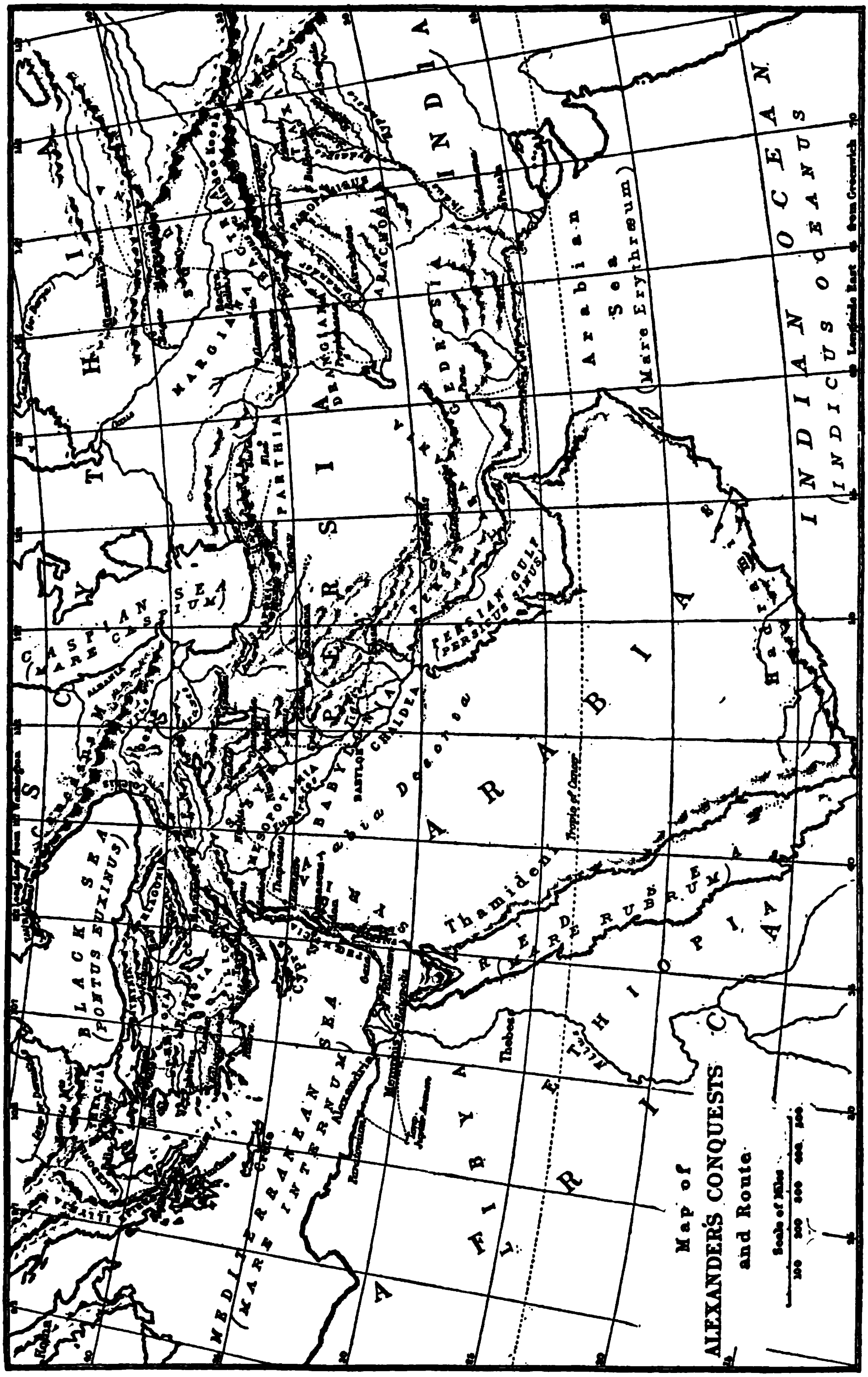
Alessandria.

ALEUTIAN ISLANDS, a chain of islands situated between Alaska and Kamtchatka, and separating Behring sea from the North Pacific ocean, between lat. 51° and 56° N., and lon. 163° and 188° W. The origin of the name is unknown, but is believed to be Russian. Although the Aleutian chain is usually regarded as co-extensive with the Catharine archipelago, an appellation applied to all the islands of this region in honor of Catharine II. of Russia, some geographers do not include in it Behring island and Copper island, near the Asiatic coast. These are known as the Komandorski or Commander's islands, and are situated in about lon. 193° W.; the Russian explorer Behring died upon that which bears his name. Omitting them, the Aleutian islands consist of four groups, as follows: 1, the Nearer (Blizhni) or Sasignan islands, 5 in number, which lie W. of the 185th parallel of W. longitude, and derive their name from their proximity to Kamtchatka; 2, the Rat (Krisi) islands, of which there are 15, situated between lon. 185° and 180° W.; 3, the Andreanovski group, extending from lon. 180° to 172° W., and containing 30 islands, on one of which, Goreloi (Burnt) island, is a mountain 8,000 feet in height; and 4, the Fox (Lisi) islands, numbering 31, lying between lon. 172° W. and the shore of the American continent, and including Unimak and Unalashka. The entire area of the islands is 6,391 geog. sq. m. Dall estimates the native population at 1,500, though it probably was not less than 10,000 when the Russians first occupied the country. The half-breeds and resident Russians do not exceed 300 in number. Unimak is the largest island of the chain and the most mountainous. Unalashka contains the greatest number of inhabitants and the finest land for agricultural purposes, and also possesses the best anchorage and principal port, Iliuliuk or Captain's Harbor. Traces of the action of subterranean igneous forces are nearly everywhere apparent, and the whole archipelago is believed to be the result of volcanic upheaval. Hot springs are of frequent occurrence. Of the numerous mountains, several are upward of 5,000 ft. high, and many are volcanoes, some of which show slight signs of activity. A rolling country, with hills of moderate elevation, intervenes between the mountains and the coast, which on most of the islands is abrupt and accessible from the sea at comparatively few points. The soil in many districts is fertile, and produces turnips, carrots, parsnips, and cabbages of fair quality, as well as a few potatoes. There is a most luxuriant growth of wild grass suitable for cattle, of which, however, very few are kept, owing to the difficulty of housing them in winter from the scarcity of wood for building purposes. The islands are entirely destitute of timber. The climate is moist and equable, with an average annual temperature of from 36° to 40°. The Aleuts resemble the North American Indians in color and other respects, but are variously regarded as of American and Asiatic origin. An active and formerly a cheerful race, their character has acquired a degree of sombreness from the forced adoption of Russian manners, customs, and religion. Their principal occupations are hunting and fishing. —The Aleutian islands were discovered by Behring in 1741, and subsequently in the same century were acquired and occupied by Russia, together with her possessions on the American mainland. In 1867 they were transferred with the latter to the United States, and now form a part of Alaska. (See supplement.)

ALEWIFE, a fish of the genus *alosa* (*A. tyrannus*, Latrobe), also called spring herring, and in the British provinces gaspereau, or American alewife. It appears in great numbers in Chesapeake bay from the south in March, on the New York and New England coasts with the shad in April, and in the British provinces about May 1. Like the shad, it ascends the northern rivers to deposit its spawn. In the bay of Fundy the alewife is abundant; in the gulf of St. Lawrence it is less common, and of smaller size; the bay of Miramichi appears to be its extreme northern limit. It ascends rivers generally to the head of the tide, and returns to the sea in July. The fishery is prosecuted with small meshed seines drawn across the streams, and so successfully that hardly a fish escapes; the fishing lasts about six weeks, commencing as soon as the rivers are clear of ice. It prefers a soft, muddy bottom, and turbid water, and its favorite food is shrimps and the shad worm. The length of the alewife is 4 to 12 inches; the body is compressed; the head small, with golden gill covers; the eyes large, with silvery iris and black pupil; the mouth very large, the lower jaw slightly the longer, and the upper jaw deeply notched in its centre. The color on the back is bluish purple; the sides are light copper color, beneath silvery; on the sides are 4, 5, or even more indistinct greenish lines passing from the head to the tail; just behind the upper angle of the gill cover is a deep black spot. The scales on the body are very large, and deciduous; the entire abdominal edge is serrated by strong bony spines, largest between the ventrals and the vent; the dorsal fin is single, and the tail is deeply notched. Though thin, dry, and inferior to the herring and the shad, the alewife is a valuable fish. For home consumption, alewives are salted and smoked, like herring. The fishery in the British provinces is valuable.

ALEXANDER. I. A N. W. county of North Carolina, bounded S. by the Catawba river; area, 300 sq. m.; pop. in 1870, 6,868, of whom 611 were colored. The staple products are wheat, corn, and oats. There are 19 churches, and 20 manufactories. Capital, Taylorsville. II. A S. county of Illinois, at the confluence of the Ohio and Mississippi rivers, the latter forming its S. and S. W. boundary and separating it from Missouri; area, 245 sq. m.; pop. in 1870, 10,564. The face of the county is low and level, and in some parts liable to inundation, and the soil is fertile. The staple products are corn and wheat. The southern terminus of the Illinois Central railroad is at Cairo in this county. Capital, Thebes.

ALEXANDER, surnamed the Great, son of Philip of Macedon and of Olympias of Epirus, born in 356 B. C., died in 323. His first tutor was a Greek, Lysimachus, and the first thing which he learned was the Iliad. At the age of 13 he received further instruction from Aristotle, and enjoyed this teaching for three years, being then warmly attached to the philosopher. During his father's lifetime he shared in his wars, and in the government of the kingdom, early showing a strong will and an imperious temper. By his bravery he decided the issue of the battle of Chæronea (338), which made Philip the master of Greece. He ascended the throne at the age of 20, on the assassination of his father, and put to death several of the guilty, as well as many relations of his father's second wife, and soon afterward Philip's infant son. At the head of an army he at once entered Greece, strengthened the submission of the Greek republics, and at a general Grecian assembly at Corinth was made commander-in-chief, with full powers on land and sea to prosecute the war against Persia. In the following spring (335), in an armed excursion against various tribes of Thracians and others north of Macedonia, he crossed the Danube without a bridge and in the face of an enemy. During this campaign rumors of his death arose in Greece. Demosthenes, in Athens, and the patriots of other Greek cities, and above all the Thebans, considered this to be a propitious moment to emancipate Hellas from Macedonian domination. The Thebans rose in arms. Alexander returned with his army in 13 days from beyond the north of Macedonia to Bœotia. After a murderous assault he razed Thebes to the ground, leaving only the house of Pindar standing, and sparing only the descendants of the poet from slavery or massacre. This blow crushed the aspirations of the Greeks for freedom.—Alexander now completed his preparations for the invasion of Asia. In March or April, 334, he crossed the Hellespont from Sestos to Abydos, with a force of 30,000 foot and 4,500 horse. This army was composed in great part of Macedonians, with Macedonian commanders. At Ilium (Troy) he performed various rites and sacrifices in honor of the ancient heroes, a manifestation of that legendary sympathy which formed the only real relation between him and the Greeks. A Persian army defended the passage of the Granicus. Alexander was the first to enter the river at the head of his troops, fought foremost with great personal courage, and won a decisive victory. Nearly the whole of Asia Minor submitted to him, and the few cities that attempted to resist, among them Halicarnassus, were taken by storm. At Tarsus in Cilicia he was seized with a violent fever, after bathing in the chilly waters of the Cydnus, and owed his recovery to the skill of his physician, Philip. The king of Persia, Darius III., commanding in person an army of five or six hundred thousand men, met him in a valley near Issus, and one of the most important and decisive battles recorded in history was fought there (333). Darius was defeated with immense slaughter, and the loss of his camp and treasures; while his mother, his wife Statira, celebrated as the handsomest woman in Asia, his infant son and two daughters, fell into the hands of the victor, by whom they were treated with unexpected magnanimity. Syria and Phœnicia submitted, with the exception of Tyre, which was taken after an arduous siege of seven months. Alexander was twice obliged to construct a mole more than 200 feet wide across the half-mile channel between the mainland and the islet on which Tyre was situated. At the final storm the carnage was terrible, and 2,000 of the defenders were hung on the walls, 30,000 inhabitants sold into slavery, and the ancient and free-spirited population wholly extirpated. —Alexander now marched toward Egypt. Of the cities of Palestine, only Gaza, commanded by Batis, a eunuch, resisted him. The town had hitherto been thought impregnable, but Alexander surrounded it with artificial mounds equal in elevation to the hill on which the stronghold was situated, and, after having been beaten off in several attacks, in one of which he was severely wounded, took the city, and slaughtered nearly the whole population (332). Batis, covered with wounds, was taken prisoner. The infuriated victor ordered his feet to be bored, and his living body to be attached to a chariot, which he drove himself in full speed through the streets. Thus he copied the ignominious treatment which, according to the legend, was inflicted by Achilles, from whom he claimed descent, on the dead body of Hector. Egypt submitted without offering the slightest resistance. Alexander founded the city of Alexandria, and marched through the desert into Libya to the temple of Jupiter Ammon (331). The priest addressed him as the son of the god, and the conqueror henceforth assumed such to be his parentage, to the great dissatisfaction of his Macedonian army and companions. He was now master of the whole eastern Mediterranean coast, and of all the islands, and returned to Asia in search of Darius, who was lost in the immense dominions which still remained to him. Alexander crossed the Euphrates and Tigris, and in the plains of Gaugamela, near Arbela, in Assyria, reached the Persian army, made up of the contingents from the Caspian sea, the rivers Oxus and Indus, the Persian gulf, and the Red sea. It is said that this army numbered 1,000,000 infantry, 40,000 cavalry, 200 chariots armed with scythes, and 15 elephants, which then made their first appearance on a field of battle beyond their native country. Alexander commanded 40,000 foot and 7,000 horse. The battle was severely contested, but at last the Persians were utterly routed (October, 331). The Persian empire was destroyed. Its two capitals, Babylon and Susa, surrendered, with immense treasures. From Susa Alexander marched into Persia proper, the cradle of the earlier Persian conquerors, overpowering various barbarian mountain tribes on the march. Persepolis and Pasargada fell into his hands, with treasures surpassing those of Babylon and Susa. He set fire to Persepolis; the male inhabitants were slain, and the females dragged into servitude. Next he continued the conquest of the eastern part of the Persian empire, following Darius into Media, Hyrcania, and Parthia, where the fugitive king was murdered by his revolted satraps (330). Alexander



Map of
ALEXANDER'S CONQUESTS
and Route

ordered the body to be buried with regal pomp in the royal sepulchres of Persia. Pursuing the satraps, he entered Aria, in the region adjoining the modern Herat. Thence he marched into Drangiana, the modern Sejestan. While at the chief town of this province, on the plea of a conspiracy against his life discovered among those nearest his person, he condemned to death Philotas, one of his first generals, and son of Parmenio, his best captain, and the companion in arms of his father Philip; and after this he ordered the murder of Parmenio himself. He had now become very intemperate, and, full of suspicion, opened the letters of his officers and soldiers to their relations in Europe. He reduced Arachosia and the Paropamisus region (modern Afghanistan), founding various cities of Greeks and Macedonians. Then he overran Bactria (329), crossed the Oxus, marched through Sogdiana, entering the principal city Maracanda, now Samarcand, and reached the river Jaxartes (Sir Daria), which he thought was the Tanaïs (Don), then considered to be the boundary between Europe and Asia. On its banks he founded a city named Alexandria, as a fortress against the nomadic Scythians, in whose pursuit he reached the present khanate of Khokand. This was the utmost limit of Alexander's northern progress. During his stay at Samarcand, on his return, in a drunken orgy, he killed with his own hand his general and friend Clitus, who had saved his life at the battle of the Granicus, and now ventured to rebuke him for his overbearing pride and infatuated belief in his divine origin. After this bloody deed, the murderer, seized with remorse, passed three days without food and drink. In Bactra (Balkh), the capital of Bactria, he celebrated in 327 an oriental marriage between himself and his captive Roxana, and in the festivities of this ceremony demanded prostration and worship from the Greeks as well as the Asiatics. Some Greek philosophers, Anaxarchus among them, led the way in this degradation; but Callisthenes, the friend and correspondent of Aristotle, opposing it, was falsely accused of a conspiracy, tortured, and put to death. From Bactra Alexander marched southward, recrossing the Paropamisus, or eastern Caucasus, now known as the Hindoo Koosh, and went into Cabool, descending along the right bank of the Indus, and reducing various mountain tribes on the way. He crossed the Indus at or near Attock, a passage now much used, and entered Taxila, whose prince, Taxiles, at once submitted, becoming a tributary ally, and furnishing a contingent to the Macedonian army. On the further side of the Hydaspes (Jhylum, in the Punjaub), he met the Indian prince Porus, with a formidable force, which he defeated, taking Porus prisoner. The latter, however, had his possessions restored and became an ally and friend of Alexander. After conquering various Indian princes and nations, Alexander passed the river Acesines (Chenaub), and advancing across the Punjaub to the river Hydraotes (Ravee), demolished the city of Sangala, putting to death 17,000 persons, and making 70,000 captives from various free Indian tribes. Thence he marched to the river Hyphasis (Sutlej). Here the Macedonians of the army, averse to plunging further into unknown deserts, refused to cross the river, and Alexander gave the order to return. To mark the limit of his eastward progress, he erected 12 altars of extraordinary height on the W. bank of the Hyphasis. Late in the autumn of 327 he embarked with a part of his army on the Hydaspes, and sailed down to the Indus, which he descended to its mouth, disembarking perpetually to attack, subdue, and slaughter the tribes near the shore. He reached the Indian ocean in the summer of 326. Nearchus, his admiral, took the fleet from the mouth of the Indus round the Persian gulf to the Tigris, while Alexander himself marched westward along the shores of the gulf, then through the desert of Gedrosia (Beloochistan) to the city of Pura (Bahnpoora). In this march the soldiers suffered much from thirst and hunger. To compensate for this, and in imitation of the festivals of Bacchus, Alexander and his army marched seven days in drunken bacchanalian procession through Carmania (Kerman), entering Persis, and finally, in the beginning of 325, reaching Susa. Here he adopted the Persian costume and ceremonial, made a eunuch, Bagoas, his favorite, and contracted two additional Asiatic marriages. He sailed down the river Pasitigris (Karun) to the Persian gulf, and, anxious for naval glory, projected the circumnavigation and conquest of Arabia. An immense fleet was built in the Phœnician ports, taken to pieces, and conveyed to Babylon, which was transformed into a harbor for the purpose. At this time he received embassies from all the nations around the Mediterranean, including the Romans, Iberians, and Gauls. Having entered Babylon in 324, he spent several days in surveying the surrounding marshes, where he contracted the germs of a violent fever. This malady was developed and heightened by his daily revelries, and finally put an end to his life after a reign of 12 years and 8 months. He appointed no successor, but before his death gave his ring to Perdiccas. Shortly afterward Roxana gave birth to a son, Alexander Ægus, who was put to death with his mother by Cassander in 311, while the conqueror's great empire was divided by his generals.—Alexander's reign forms one of the pivots of the world's history. By it Asia and the East were interwoven with Europe and Greece, while the free Greek communities were crushed and democratic progress and liberty entombed. His generalship, his knowledge of command, his strategic combinations, his far-reaching plans, his foresight and fertility in difficulties, his rapidity of movement, are almost without a parallel in history, when we consider the time, the regions where he acted, and the resources at his disposal. With all his courage and his sanguine temperament, nothing was ever omitted in the way of systematic military precaution. Nor is his life devoid of other traits of greatness. The acquisition of universal dominion was the master passion of his soul. He had no attachment for any special nationality, but looked on all mankind as on a realm to be conquered and ruled. His conquests caused an immense diffusion of Hellenic culture, and influenced for ages the condition of western Asia and of Egypt.

ALEXANDER, the name of eight popes. **I. Saint,** a Roman by birth, according to ecclesiastical tradition, governed the church from 108 to 119, and was beheaded by order of the emperor Hadrian. A beautiful church has been erected over his tomb. **II. Anselmo Badagio,** born in Milan, was bishop of Lucca, became pope through the influence of Hildebrand (afterward Gregory VII.), and reigned from 1061 to 1073. The first few years of his reign were troubled by a contest with an anti-pope named Cadaloüs, who took the name of Honorius II. He carried out with great vigor and ability the measures of the reforming party in the church of which Hildebrand was the life and soul, against simony and concubinage among the clergy, and the intrusion of unworthy bishops into the episcopal sees through the influence of princes and nobles. By the advice of Hildebrand, he pronounced in favor of the claims of William of Normandy to the crown of England, as successor to Edward the Confessor. After the success of William's arms, in 1066, he sent as legate into England Bishop Ermenfroi, and the cardinals Peter and John, who crowned King William, and afterward held a council at Winchester, in which Stigand, the excommunicated archbishop of Canterbury, who had intruded himself into that see during the lifetime of the archbishop Robert, was deposed. The celebrated Lanfranc, formerly the preceptor of Alexander, was placed in that see, and afterward received by the pope with great honor at Rome. Alexander maintained close relations with the Byzantine empire, and sent a legate to the Greek court. A number of his epistles are extant, among which is one addressed to the bishops of France, in which he condemns in the strongest terms the cruelties practised by some Christians on the Jews. **III. Rolando Bandinelli,** born in Siena, elected Sept. 7, 1159, died Aug. 1, 1181. He had to sustain a long conflict with Frederick Barbarossa and four successive anti-popes, one of whom, styling himself Calixtus III., came to him at Frascati in 1178, threw himself at his feet, and demanded absolution, which Pope Alexander granted immediately, inviting him to his own table. The emperor, who had been excommunicated, submitted after a protracted struggle in 1177, and was absolved from his excommunication at Venice. On this occasion he paid the ordinary homage to the pope by kissing his foot, and leading the mule on which he rode; but the story that the pope put his foot on his neck appears to rest on no historical foundation. Alexander entered into correspondence with the Greek emperor Manuel, with the view of inducing him to consent to a project, much favored at that time in Italy, of transferring the imperial throne to Rome, and thus effecting a permanent reconciliation of the Greeks to the Roman church. These negotiations, however, had no result. He also held at Tours in France, where he had taken refuge in the early part of his pontificate, a council against the Albigenses. Supported by him, Thomas à Becket carried on the ecclesiastical struggle with King Henry II. of England. À Becket and St. Bernard were canonized by Alexander III., a right which he first reserved exclusively to the holy see by a decree promulgated at the council of Tours. It was this pope who instituted the ceremony of the espousal of the Adriatic by the doge of Venice. The last remarkable act of his life was the celebration of the third general council of Lateran at Rome, in 1179. **IV. Rinaldo di Segni,** a Roman, nephew of Gregory IX., and cardinal bishop of Ostia, elected at Naples, Dec. 12, 1254, died at Viterbo, May 25, 1261. During his reign the states of the church were devastated by Manfred, the natural son of the emperor Frederick II. He declared a crusade against Manfred, which proved unsuccessful, even with the aid of Henry III. of England, to whose second son Edmund he gave, in quality of suzerain, the investiture of the kingdom of Sicily. During his reign occurred also the crusade and captivity of St. Louis of France. By request of this prince, the inquisition was established in France in 1255. This pontiff was compelled to pass the latter part of his life at Viterbo, on account of seditions among the Roman populace. He labored to reunite the Greek to the Roman church, and to combine the Christian nations against the Moslems. The hostility of the Venetians and Genoese prevented the success of his plans, and the chagrin which he experienced in consequence is said to have caused his death. **V. Pietro Filargo,** born in Candia, elected by the general council of Pisa, June 26, 1409, died May 3, 1410. He was originally a beggar, and was educated by a charitable Franciscan, and sent to Oxford and Paris, where he greatly distinguished himself. On his return he became private tutor to the duke of Milan, and afterward archbishop of that city. Innocent VII. made him cardinal and papal legate in Lombardy. After his elevation to the pontificate, he resided at Bologna. **VI. Rodrigo Lenzuolo,** or **Borgia,** born in Valencia, Spain, in 1431, elected pope Aug. 11, 1492, died Aug. 18, 1503. His mother was a Borgia and the sister of Pope Calixtus III. His father was an officer of rank, and Rodrigo passed his youth first in the study of law and in civil offices, and afterward in the profession of arms, for which he displayed considerable talent. He formed a criminal relation with a widow, and after her death took for his mistress her daughter, Rosa

Vanozza, by whom he had five children, one of whom was Cæsar Borgia, and another Lucretia, afterward duchess of Este. When his uncle became pope, Rodrigo was summoned to Rome. He went with reluctance; but whatever unwillingness he may have felt to abandon his pleasures in Spain was overcome by the generosity of the pontiff, who hastened to appoint him archbishop of Valencia, cardinal deacon, and vice chancellor of the church, and gave him a revenue of 28,000 crowns a year. Without breaking off his connection with Vanozza, he now assumed an exterior of piety and humility, visited the hospitals, gave much to the poor, and acquired a reputation for extraordinary virtue. Under Popes Pius II. and Paul II., who wore the tiara after Calixtus, little is known of his life. He was high in the favor of Sixtus IV., who sent him as legate to Aragon and Portugal; but he is said to have caused some scandal at the court of Lisbon by his licentious behavior. After the accession of Innocent VIII. (1484) he brought his mistress secretly to Rome, and furnished her with an ostensible husband, in the person of a Spaniard who had been her majordomo. Under the protection of this pseudo count, the cardinal was enabled to visit Vanozza without suspicion. On the death of Innocent in 1492 he bought the suffrages of the adherents of Cardinals Sforza, Orsino, Riario, and Colonna, and, having been thereupon elected to the pontificate, delivered an edifying discourse in which he urged the sacred college to reform their lives, and denounced with especial severity the crimes of avarice and simony. His eldest son, Francesco, was appointed commander of the papal troops; his second son, Cæsar, was made archbishop of Valencia, and a year later cardinal. The Papal States were at this time in a very disturbed condition, and Alexander's first care was to strengthen the temporal power by crushing the turbulent lords of Ferrara, Bologna, Rimini, Faenza, Ostia, and Urbino, forming a league against Naples with Venice and Milan, and then a league with Naples against France. Unable to prevent the invasion of Italy by Charles VIII., he made his peace with the French king at an interview in the Vatican; and after Charles had taken possession of Naples he instigated a new confederation against him, composed of the republic of Venice, the duke of Milan, and the other princes of Italy, and succeeded at last in ridding the peninsula of the invaders. He allied himself with Charles's successor, Louis XII., in an attack upon Milan, granted the king a divorce, and obtained for his son Cæsar a splendid position at the French court. He was a party to the treachery by which Ferdinand of Spain first betrayed the cause of his relative Frederick of Naples by partitioning that kingdom between Louis XII. and himself, and then betrayed Louis by seizing the whole conquest. Cæsar had accompanied the French to Milan, and thence waged incessant war upon the Italian princes, the pope's purpose being not only to consolidate his own temporal power, but to elevate his family to the dignities of the dispossessed barons. Vile as the means were by which he accumulated wealth, he spent it in such a way within his dominions, restoring order and reviving trade, that he was popular with his subjects. He carried simony to a point never before dreamed of, and a contemporary pasquinade began with the lines,

Vendit Alexander claves, altaria, Christum;
Vendere jure potest, emerat ille prius.

The crimes of wholesale poisoning and other murders commonly laid to his charge are not all supported by sufficient evidence, but enough is known to entitle him to remembrance as the worst of all the popes. His death is said by some historians to have been caused by poison which he intended for a large party of cardinals whom he had invited to a banquet. **VII. Fabio Chigi,** born of an illustrious family at Siena, Feb. 13, 1599, elected April 7, 1655, died May 22, 1667. Before his election he filled several of the highest offices of the Roman church with credit. During his pontificate he was zealous in the reformation of discipline. He confirmed the bull of Innocent X. against the five propositions of Jansenius, and prescribed a formulary condemning the principles of Jansenism, which all persons concerned were required to sign. He finished the college of Sapienza, commenced by Leo X. after designs of Michel Angelo, and constructed the beautiful colonnade in the piazza of St. Peter's. **VIII. Marco Ottoboni,** son of the grand chancellor of Venice, where he was born, April 19, 1610, elected Oct. 6, 1689, died Feb. 1, 1691. He studied at Padua and Rome, was successively bishop of Brescia and Frascati, and cardinal. He condemned the four articles of the Gallican assembly, and assisted the emperor Leopold I. and the Venetians with large sums in the wars against the Turks. He possessed a high degree of prudence, moderation, and political sagacity, and was very benevolent to the poor, but too much inclined to favor his own relations.

ALEXANDER I., Pavlovitch, emperor of Russia, eldest son of Paul I. and Maria Feodorovna, princess of Würtemberg, born Dec. 23, 1777, died Dec. 1, 1825. His grandmother, Catharine II., designed to place him on the throne in preference to his father, and intrusted the care of his education to Count Nicholas Soltikoff, drawing up the plan of his instruction with her own hand. Every possible branch was taught except music and singing. In 1783 Count Soltikoff selected as his tutor Frédéric César de la Harpe, who inculcated in the mind of his pupil the ruling liberal ideas of the 18th century. Toleration, philanthropy, and love of truth were from his childhood familiar to the future czar. Sometimes he dreaded the task before him, and wished to escape with his youthful friend Prince Czartoryski to America, and to live there as a private citizen. At the age of

15 he was married to Louisa Maria Augusta, princess of Baden, who was somewhat younger still. This marriage was not a happy one. Catharine died three years afterward, and was succeeded by her son Paul I., whose short reign was ended by murder, March 23, 1801. Alexander stands accused of having been accessory to this crime. He was acquainted with the conspiracy, whose chief, Count Pahlen, persuaded him that his mother and his brother Constantine were in danger of losing their liberty, and even their lives, from the jealous suspicions of his half-insane father. Alexander, fully believing his father incompetent to reign, gave his consent to the dethronement, which alone was represented to be the aim of the conspirators. Once on the throne, the young czar attracted the attention of the world, and his generous qualities promised a brilliant future. He began by releasing and indemnifying the victims of the violent injustice of his father, and recalled many who had been exiled to Siberia. He kindled civilization among the masses, made efforts to create a public spirit among the people, and accomplished radical reforms in the administration. He abolished the secret tribunal established by Paul, suppressed the censorship, reorganized the board constituted by Catharine for the creation of a national code, ordered every minister to publish yearly reports, decreed the abolition of torture (which, however, continued to be partially applied even under him), and renewed the ukase of Catharine in virtue of which hereditary estates could not be confiscated, and proclaimed that henceforth the czars should not give away estates with crown peasants, but lands alone. He prohibited the public exposure of serfs in markets for sale, and allowed them to be sold only with the land to which they were attached. He chose for ministers men of large and clear minds, devoted to his reformatory ideas. Among these were Czartoryski, Novosiltzoff, and Speranski. He was impressible, enthusiastic, and easily influenced, not steady and persistent. His mode of life was simple and unostentatious; his manners were amiable, refined, and elegant. He concluded commercial treaties with various powers, and published new regulations for navigation. He protected the arts, and in order to stir up the intellectual powers of the people allowed his subjects of various classes, except those serfs who were private property, to select their own trades and pursuits. The raw products of Russia, and even some manufactures, now began to appear in the marts of Europe. In 1809 he erected three universities, at St. Petersburg, Kharkov, and Kazan, and added to them afterward that of Dorpat for the German Baltic provinces. He also reorganized that of Wilna for his Polish subjects, whom at that early epoch he treated generously, flattering them with hopes of the reconstruction of their kingdom. He founded many gymnasia and high schools, ordering their number to be increased to 204, with 2,000 subordinate elementary schools; but this project was only partially executed. He was wont to travel over the country in every direction, seeing persons of all classes and receiving their memorials. He scrupulously observed the ordinances of the national church, but later in life he became a pietist and mystic, at the same time that he turned against the liberal politics of his youth.—At an early period in his career Alexander was entangled in the great events which shook Europe in the beginning of the present century. The greatness of Napoleon, then first consul, impressed his imagination. His father had commenced a friendly intercourse with Napoleon, which the son continued. On Oct. 8, 1801, he concluded a treaty of friendship, and when next year a general peace was established by the treaty of Amiens, the new territorial organization of Germany was regulated by the two. But when Napoleon, after making himself emperor, violated the territory of Baden, announced his purpose to assume the crown of Italy, prepared to destroy the independence of the Batavian republic, and occupied almost the whole coast of northern Germany, Alexander put forth a solemn protest along with a warning against a continuance in this course of usurpation. Finally, although a war was brewing between Russia and Turkey, and another actually waging against Persia, Alexander entered the third coalition to overthrow Napoleon formed by Sweden, England, and Austria. On Oct. 5, 1805, a Russian army debarked in Pomerania, and at the same time another traversed Prussia, although that power was neutral. The battle of Austerlitz, Dec. 2, 1805, destroyed the coalition, and Alexander barely escaped being made prisoner by a French general cutting off the retreat of his escort. The czar pledged his written word of honor to this officer that an armistice had been concluded, which, however, was not the case. The Russian troops retreated to Silesia, and Alexander returned to St. Petersburg to prepare new armaments, when his ally Francis of Austria made peace with the enemy. The czar, however, refused to ratify the treaty made in Paris by his minister D'Oubril, and formed an intimate alliance with Prussia. He conceived a Platonic affection for Queen Louise, to whose husband, Frederick William III., he was bound by the ties of a strong friendship. This new coalition had no better luck than its predecessor. The Prussian forces were annihilated at Jena and Auerstädt (Oct. 14, 1806), the Russian Marshal Benningsen was beaten at Eylau (Feb. 8, 1807) and Friedland (June 14), and Kamenski was defeated at Pultusk. The Russian armies reëntered their own country, and the king of Prussia was left in possession of only the city of Memel, on the Russian frontier. At the same time, however, the Russian arms were more successful in the war with the Turks. The Serbs rose against the Porte, and Admiral Seniavin

beat the Turkish fleet in the Archipelago. Prussia being annihilated, and Napoleon at the threshold of Russia, Alexander was forced to negotiate. In June, 1807, the two emperors met on a raft on the river Niemen, the frontier between Prussia and Russia. In the course of their now almost daily intercourse, Napoleon not only bewitched Alexander by his genius and his manners, but did not disdain to flatter the foibles of the czar, whose former resentment gave way to the most enthusiastic friendship and admiration. By the treaty of Tilsit, Alexander got from the Prussian spoils the district of Bialystok in Lithuania. He entered warmly into all the Napoleonic schemes, and accepted the continental system, though it was pernicious at the start to the agricultural interests and the exporting trade of Russia. Gustavus IV. having rejected every plan of accommodation with France, and refused the invitation of Russia to exclude English vessels from Swedish harbors, Alexander declared war against Sweden, invaded Finland, and conquered the long-coveted duchy. The war was not yet ended when the interview of Erfurt took place, beginning Sept. 27, 1808. Here culminated the friendship of the two emperors, who, representing the west and the east, decided the destinies of Europe. The resistance of the Spaniards to Joseph Bonaparte, and English subsidies, encouraged the court of Vienna to appeal to arms for the third time in 1809. Alexander, as the ally of Napoleon, occupied Galicia, and at the peace got a slice of it. In Turkey, the fortresses of Rustchuk, Giurgevo, and Silistria were taken, and the bulk of the Turkish army on the left side of the Danube laid down their arms before Kutuzoff. The war with Persia was also successful. In the interior Alexander continued the work of reform. The exclusion of English manufactures gave activity to domestic industry. In 1810 he reorganized the council of the empire, and formed eight separate departments or ministries. He regulated the value of the currency, introduced a new organization into Finland, and in 1811 inaugurated the church of the Holy Virgin of Kazan, one of the great monuments of St. Petersburg. About this epoch a revolution took place in his feelings toward Napoleon, and he inclined to the ancient party of his nobles, who were enemies of France and of domestic reforms, and partisans of England. Under this influence he exiled some of his former favorites, who for years had labored with him in the task of reform. Napoleon now occupied the duchy of Oldenburg, and Alexander refused him his sister in marriage. The immense majority of the Russian nobility were hostile to the French alliance. Animosity increased, and the war of 1812 broke out. England and Sweden alone stood by Russia—at that time helpless and negative allies; but the treaty of Bucharest, concluded in that year by the mediation of England, on terms wholly advantageous to Russia, disengaged the Russian armies operating on the Pruth and the Danube. Napoleon rapidly crossed the Niemen and invaded Russia, directing one part of his forces north toward St. Petersburg, while he himself pressed with the mass upon the centre of the empire toward Moscow. Alexander was taken almost unawares. He adopted the plan of Gen. Barclay de Tolly, retiring slowly step by step, to draw the enemy into the interior, destroying everything in the retreat, and thus facilitating the union of the central army with that coming from Turkey. He made an appeal to the religious and national feelings of the Russians, and organized levies *en masse*. The people were even more excited than their ruler. After the battle of Smolensk (Aug. 17) he transferred the command of the retreating but not dispirited army to Kutuzoff, yielding to the desire of the nation to be commanded by a native Russian. It is not ascertained whether he ordered the burning of Moscow, but at any rate he approved the act. He refused all accommodation with Napoleon, answering that he had only begun the campaign, and would not treat while a foot of his dominions was occupied by the enemy. The retreat of the French, the terrible crossing of the Beresina, and the final annihilation of the invaders, are well known. The Russian forces now overran the duchy of Warsaw, which had been created by the treaty of Tilsit, and whose free institutions had caused much uneasiness in Russia; and soon afterward it was definitively incorporated with the empire. The advisers of Alexander—Kutuzoff, Volkonski, Araktcheyeff, Balashoff—insisted on arresting there the further pursuit of the French, and leaving the rest of Europe to its fate. But England urged the continuation of the war, Prussia asked for help, and Alexander, in his manifestoes from Warsaw, Feb. 22, and Kalisz, March 25, 1813, appealed to the European nations as the redeemer of the continent. In Kalisz an offensive treaty against Napoleon was concluded between Russia, Prussia, and England, at the same time that the czar, animated with new impulses of religion, founded a Bible society, to spread the gospel among all nations. He took part personally in various battles in Germany and France, where he arrived as the leader of the crusade against Napoleon. On Oct. 12, 1813, the treaty of Gulistan put an end to the war with Persia, and Russia acquired thereby a part of the Caucasus and of Armenia. In Paris, Alexander defended the integrity of France against others of the allies. In June, 1814, he visited London, where he was brilliantly received. In July of the same year he made a short visit to St. Petersburg. The senate proffered to him the title of "God-sent," which he refused. At the congress of Vienna, of which he was the most influential member, he gave to his newly conquered subjects, the Poles, a constitution, of which Carnot said that it was too good to be observed.—Napoleon's escape from Elba now shook Europe anew. On March 13, 1815, Alexander signed the proclamation by which the great soldier was outlawed. Waterloo soon followed, and for the second time Alexander entered Paris victoriously, July 11, 1815. His religious excitement now increased, and with it his indifference first, and then his hostility to liberty. In Paris, in 1815, under the inspirations of the celebrated Mme. Krüdener, he formed the holy alliance, which was to base the political order of the world on the principles of Christianity, or, as it came to be understood, of despotism. The czar now took the lead in European affairs. In Russia trade and industry revived, and efforts were made to expand the national resources. Alexander was inspired with the best intentions, but lacked the energy to carry them out. He began a partial abolition of serfdom by emancipating the serfs in the German Baltic provinces, but without allowing the peasantry the liberty of migrating from one province to another. In 1818 he virtually presided at the congress of Aix-la-Chapelle, and from that epoch may be dated the complete abandonment of his once cherished liberal and reformatory ideas. Exhausted bodily by various excesses, and mentally by the pressure of the terrible events in which for more than ten years he had played a part requiring almost superhuman efforts, he became the leader of the reaction against all free tendencies. Metternich adroitly played upon his fears, and he almost wholly abandoned to his ministers the internal administration of Russia, while he devoted himself to suppressing liberal movements in Italy, Spain, Portugal, and Germany. At the congresses of Troppau (1820), Laybach (1821), and Verona (1822), he urgently sustained this policy. The constitution of Poland had been violated in its principal parts. Irritation increased between the nation and the sovereign; conspiracies were formed in connection with the Carbonarism then existing in France and the south of Europe. At the same time new ideas were brought to Russia by the armies returning from the west, especially by those which had occupied France for several years. The political institutions and social state of other nations thus becoming better known, the desire spread rapidly for changes more in harmony with the spirit of the age. Discontent was increased by the absence of administrative ability and integrity. The army was disorganized. In imitation of Austria, and with the view of surrounding St. Petersburg with an immense military force, military colonies of the peasantry were created by Araktcheyeff, now the virtual ruler of the country. The censorship of the press was exceedingly severe. Alexander became more and more the prey of hypochondria, gloomy, distrustful, inaccessible. The man who once received with a smile the memorials presented by his subjects, now ordered that any one who approached him in public should be arrested and kept 24 hours in prison. Once an active freemason, he now suppressed the lodges throughout the empire. The secret police, whose operations embraced not only Russia but all Europe, became more active than ever, the grand duke Constantine, brother of the czar, being at its head. The Jesuits, who, even after their suppression in the 18th century all over the world, had been tolerated in Lithuania and Russia, were expelled in 1821 and 1822, for spreading Roman Catholicism among wealthy Russian families, and their establishment at St. Petersburg was handed over to the Dominicans. Alexander estranged himself from many who had once been his friends. Only Volkonski, a thorough absolutist, but otherwise noble-minded, and Araktcheyeff, a despot by nature, remained unshaken in his favor. Araktcheyeff, indeed, had been the favorite of Paul, and Alexander retained him near his person during his whole reign, as if to atone for his father's murder. Joseph de Maistre, the philosopher of absolutism, then residing at St. Petersburg, said of the czar after an interview that despotism was breathed out of his nostrils. Alexander accused his people, the Poles, and all Europe indeed, of ingratitude. He hated every spot in turn, quitting St. Petersburg and Russia to visit foreign countries, and returning equally dissatisfied. Finally the outbreak in Greece fearfully increased the dissidence between the czar and the nation. The feeling and sympathies of the people were with the insurgents. For more than half a century the whole influence of Russia had been employed to stir up the Greeks. Now, when the moment of action came, Alexander, under the advice of Metternich and Nesselrode, opposed the natural policy of Russia, abandoned the Greeks to their fate, and suffered one of their leaders, Alexander Ypsilanti, once his favorite aide-de-camp and confidant, to pine in Austrian dungeons. The marriage of the czar being childless, he had become fondly attached to a natural daughter by Mme. Naryshkin. The death of this girl, coupled with a fearful inundation at St. Petersburg in 1824, destroyed his mental equilibrium. These catastrophes he considered as the punishment of parricide. In September, 1825, in compliance with the order of his physicians, he went with his wife on a journey to southern Russia. Arriving at Taganrog, he left the empress and continued his excursion into the Crimea. Attacked by the Crimean fever, combined with erysipelas, he returned to Taganrog, where he died. A few weeks before his death Count Witt, one of the chief authorities of the military colonies in the south of Russia, disclosed to him the existence of a wide-spread conspiracy against the imperial family. He, however, was unmoved by the information, and his successor, his brother Nicholas, had to fight his way to the throne.

ALEXANDER II., Nicolaievitch, emperor of Russia, son of the czar Nicholas and Alexandra Feodorovna (originally Charlotte), a sister of Frederick William IV. and William I.

of Prussia, born April 29, 1818. From the cradle he was the object of the most tender love of both his parents. His education was exceedingly careful. His father directed it, and gave almost daily attention to its progress. Gen. Frederics, and afterward Gen. Kavelin, were his immediate tutors. Contrary to the previous usage with Russian imperial princes, his uncle Alexander I. and his father were educated by foreigners. Alexander II. received instruction mainly from native Russians, among whom Zhukovsky, one of the greatest Russian poets, filled the chief place. Without transcendent abilities, Alexander learned well everything taught him. His judgment and perception were clear, and he seldom showed those outbreaks of violent passion which had always been prominent characteristics of the Romanoffs. This gentleness of character he inherited from his mother. Early in youth he showed a love of justice and forbearance, often trying to assuage the feelings which had been wounded by the asperity of his father. Before seeing foreign countries, according to the wish of Nicholas, he travelled all over Russia. When he approached manhood, the prince de Lieven, formerly Russian ambassador in London, was made his tutor, principally to acquaint him with the diplomacy of Europe, its routine and etiquette, and to accompany him in his travels in England, Germany, and Italy. His father's antipathy to Louis Philippe, however, prevented him from visiting France during the reign of that king. On April 28, 1841, he married Maria Alexandrovna, daughter of the grand duke of Hesse-Darmstadt, born in 1824. It was wholly a love match, the young prince having made his own choice among a host of German princesses. His majority was declared on May 8, 1834, and from the age of 18 he was admitted by his father to study the difficult task of governing the empire, by attendance at all the sittings of ministers with the emperor; and when in 1846 Nicholas resided for several months in Italy, he delegated to his son all his vast powers. Indeed, to the end of his father's life the relations of the two were most confidential and affectionate. On March 2, 1855, he mounted the throne, at a most critical moment for Russia. Nicholas had left the country engaged single-handed in a war against England, France, Turkey, and Sardinia, with Austria as a passive enemy. For a year Alexander unflinchingly continued the strife. Sebastopol was taken in September, 1855; but the allies won nothing more, and the Russian resistance continued. During the ensuing winter the neutral German states, especially Prussia and Saxony, finding Louis Napoleon not averse to peace, offered mediation. An armistice was agreed upon in March, 1856, a conference convoked at Paris, and a final treaty concluded there on the 30th of that month. On Sept. 7, 1856, Alexander was solemnly crowned at Moscow. Since then he has relaxed the lines drawn to the utmost tension by his predecessor. He began with emancipating the nation from the military routine which permeated every branch of the administration. He reorganized the army, dissolved the greater part of the military colonies, freed public instruction from military discipline, and, instead of placing discharged officers as tutors and professors at the head of the educational establishments, appointed men fitted by special studies for these positions. The censorship was considerably relaxed and limited, and for the first time genuine publicity was introduced into Russia. He prohibited espionage, and instituted measures against official corruption, allowing it to be ferreted out and exposed. He advanced young men in the different branches of the public service, superseding those whose only merit was long routine. He gave a new impulse to internal industry and trade, at the same time that he sought to develop the national commercial marine, and to induce native merchants to extend their relations with foreign countries. He annulled the impediments which prevented Russians from visiting foreign lands; granted a general amnesty for political offenders, Poles and Russians, recalling the exiles from Siberia, and allowing fugitives to return; and inaugurated that vast system of internal communication which is to cover his immense empire with nets of railroads. His greatest measure of reform, however, is the emancipation of the serfs. He had conceived from his earliest youth the idea of this measure, and was assisted by Nicholas Milutin and Gen. Rostoftzoff in the preliminary steps. He silenced the opposition of the serf-owners by intimating to them that if there was to be revolution, it had better begin at the summit than at the bottom of society. Their emancipation was decreed March 3, 1861, and carried out within the following two years. His reformatory activity, however, was interrupted, and to a degree checked, by the Polish insurrection of January, 1863, which was finally crushed in the spring of 1864, and punished by the most rigorous measures against Polish nationality, followed by restrictions of a milder kind imposed upon other non-Russian provinces of the empire. In 1865 the czar rejected the demand of the old Moscow nobility for a representative government. An attempt upon his life, April 16, 1866, by Dimitri Karakozoff, was frustrated by the interposition of the peasant Komisaroff, who was ennobled as a reward for his action. A second attempt upon his life was made at the Paris exhibition of 1867, by Berezowski, a Pole. The work of reform was resumed in 1870, when the surprising successes of the Germans startled the Russian nation. The hereditary character of the priesthood was abolished, the army system was reorganized on the Prussian model, and vast measures for education were inaugurated. While persevering in his steady progress of annexation in central Asia, the czar in 1867 divested himself of his foothold on the American continent by the sale of Alaska. During the Franco-German war he secured at the London conference of 1870, by a modification of the treaty of Paris of 1856, the deneutralization of the Black sea.—ALEXANDER ALEXANDROVITCH, son of the preceding, and, since the death of his elder brother Nicholas in 1865, cezarevitch or heir apparent to the throne, was born March 10, 1845. In 1866 he married the Danish princess Dagmar, who had been engaged to his elder brother. Their eldest child, NICHOLAS ALEXANDROVITCH, was born May 18, 1868. The cezarevitch is noted for his sympathies with the old Russian party, who are prejudiced against the Germans, and against all foreigners. His younger brother, Alexis, visited the United States in 1871–'2.

ALEXANDER III. See supplement.

ALEXANDER, the name of three kings of Scotland. **I.** Succeeded his brother Edgar, Jan. 8, 1107, and died April 27, 1124. He was a prince of singular energy and capacity, which stood him in good stead during the rebellions that disturbed his reign, all of which he suppressed. He secured the independence of the Scottish hierarchy, opposed the pretensions of the English bishops, and cultivated letters. **II.** Succeeded his father, William the Lion, Dec. 4, 1214, and died July 8, 1249. He stands conspicuous among Scottish kings for administrative ability and equity. He united with the league of English barons against King John, and was consequently for two years under excommunication. On the accession of Henry III., Alexander ratified a peace with England by marrying Henry's sister, after whose death without issue Henry invaded Scotland; but the Scottish barons rallied in such force to the support of their king that the war was concluded without a battle. **III.** Son of the preceding by his second wife, a French lady, succeeded his father at the age of 8, married the daughter of Henry III. at the age of 10, and died March 16, 1286. He defeated the attempts of Henry to obtain a controlling influence in Scottish affairs, repelled an invasion of Haco, king of Norway (1263), securing as a consequence the allegiance of the Hebrides and the Isle of Man, and brought about a marriage between his daughter Margaret and the Norwegian king Eric (1282). Margaret died the next year, leaving a daughter Margaret, called the Maiden of Norway, whose death on the way to take possession of her throne was the cause of great misfortunes to Scotland.

ALEXANDER, Alexander Humphreys, a claimant of the earldom of Stirling, born in Birmingham, England, about 1783. In 1824 he obtained the royal license to assume the name of Alexander, on the ground that he had a maternal grandfather of that name, that his deceased mother was a great-great-granddaughter of the Hon. John Alexander, fourth son of the last earl of Stirling (see ALEXANDER, WILLIAM), and that, all intermediate heirs being extinct, he was sole heir to the honors and property of the earldom and charter. For a short time he succeeded in exercising the privileges of earl without undergoing any legal investigation of his claims, and he even claimed from the crown a vast territory in Nova Scotia, which he declared had been granted to the earls of Stirling. He raised large sums on these pretensions, and assumed various rights in connection with them; but at last his claims were challenged by the crown lawyers of Scotland in 1839, and a trial ensued, in which Humphreys (Alexander) brought forward to prove his pedigree several documents purporting to be old manuscripts brought to light in various mysterious ways. These were, however, proved to be forgeries; and his pretensions being thus brought to an end, he withdrew into obscurity.

ALEXANDER, Archibald, D. D., an American Presbyterian divine, born in Augusta county (now Rockbridge), Va., April 17, 1772, died in Princeton, N. J., Oct. 22, 1851. His grandfather, Archibald Alexander, was of Scotch descent, though an emigrant from Ireland, whence he came to Pennsylvania in 1736, and, after a residence there of about two years, removed to Virginia. His son William, the father of the subject of this sketch, was a farmer and trader. At the age of 10 years Archibald was sent to the academy of the Rev. William Graham, at Timber Ridge meeting house, and at the age of 17 he became tutor in the family of Gen. John Posey, of the Wilderness, twelve miles west of Fredericksburg. He remained there but one year, and in 1789 he returned home and resumed his studies with Mr. Graham. At this time his mind became influenced by the remarkable religious movement which is yet spoken of as "the great revival," and he turned his attention to divinity. He was licensed at Winchester, Oct. 1, 1791, and spent some years in itinerant missionary service in different parts of his native state. In 1796 he succeeded Dr. John Blair Smith as president of Hampden Sidney college, but in 1801 resigned, and made a journey to New York and New England. While on his way to the north he visited the Rev. Dr. Waddel, the celebrated "blind preacher" mentioned by Mr. Wirt in the "British Spy," and contracted a matrimonial engagement with his daughter, Janetta, whom he married on his return in 1802. He then resumed his former position at Hampden Sidney college, but owing to insubordination among the students he accepted a call from the Pine street church in Philadelphia, where he was installed pastor May 30, 1807. The degree of D. D. was conferred upon him by the college of New Jersey in 1810, and in the same year he was elected president of Union college in Georgia, a fact which remained unknown even by his family until after his death. The theological seminary at Princeton was established by the general assembly of the Presbyterian church in 1811, and Dr. Alexander was by common consent elected as its first theological professor, which position he sustained until his death. He published "Outlines of the Evidences of Christianity," which has passed through numerous editions in various languages, and is recognized as a text book in several colleges; "Treatise on the Canon of the Old and New Testament" (1826); "History of the Patriarchs" (1833); "Essays on Religious Experience" (1840); "History of African Colonization" (1846); "History of the Log College" (1846); and a "History of the Israelitish Nation" (1852). His work on "Moral Science" was published after his death; and among his unfinished works are one on the "Duties and Consolations of the Christian"; one on "Patriarchal Theology"; a memoir of his old instructor, Mr. Graham; a history of the Presbyterian church in Virginia; biographical sketches of distinguished American clergymen and alumni of the college of New Jersey; and a work on "Church Polity and Discipline."

ALEXANDER, Sir **James Edward,** a British soldier and writer, born in Scotland in 1803. He is descended from the Stirling family, studied at Sandhurst, served in the Burman war (1825), in the Russian service against Turkey (1829), in Dom Pedro's cause in Portugal (1834), in quelling the disturbances in Canada (1839), in the Crimean war, after the close of which he became colonel (1858), and in the Maori war in New Zealand (1863). He has published "Travels from India to England" (London, 1827); "Expedition of Discovery into the Interior of Africa" (1838), undertaken while stationed at Cape Town; "Passages in the Life of a Soldier" (1857); and "Incidents of the late Maori War" (1863).

ALEXANDER, James Waddel, D. D., eldest son of Dr. Archibald Alexander, born in Louisa county, Va., March 13, 1804, died at the Red Sweet Springs, Va., July 31, 1859. He graduated at the college of New Jersey in 1820, was appointed a tutor there in 1824, resigned in the following year, was settled as pastor of a congregation in Charlotte county, Va., and in 1828 accepted a call to Trenton, N. J. In 1830 he resigned that charge and became editor of "The Presbyterian," a religious newspaper published in Philadelphia, whence he was called in 1833 to the professorship of rhetoric and belles-lettres in the college of New Jersey. In 1844 he accepted the pastoral charge of the Duane street church in New York. In 1849 he was appointed professor of ecclesiastical history and church government in the theological seminary at Princeton, where he remained till 1851, when he was chosen pastor of the Fifth avenue church in New York, which station he held till his death. His published works include "Consolation, in Discourses on Select Topics, addressed to the Suffering People of God"; "Thoughts on Family Worship"; "Plain Words to a Young Communicant"; "Thoughts on Preaching"; a series of essays entitled "The American Mechanic and Workingman"; "Discourses on Christian Faith and Practice"; a biography of Dr. Archibald Alexander; and numerous contributions to the "Biblical Repertory" and "Princeton Review," as well as to the publications of the American tract society. The Rev. John Hall, D. D., edited in 1860 "Forty Years' Familiar Letters of James W. Alexander," with notes (2 vols. 12mo).

ALEXANDER, Joseph Addison, D. D., third son of Dr. Archibald Alexander, born in Philadelphia, April 24, 1809, died at Princeton, N. J., Jan. 28, 1860. He graduated at the college of New Jersey in 1826, and from 1830 to 1833 was adjunct professor of ancient languages and literature. He was afterward assistant teacher of Biblical and oriental literature in Princeton theological seminary, and in 1838 was elected by the general assembly of the Presbyterian church professor of Biblical criticism and ecclesiastical history. In 1852 he was transferred to the chair of Biblical and ecclesiastical history, which he occupied till his death. He published "The Psalms Translated and Explained" (3 vols. 12mo, 1850); "The Prophecies of Isaiah" (revised ed., 2 vols. 8vo, 1864), and an abridgment of the same work; a volume on primitive church government, and numerous essays in the "Biblical Repertory" and "Princeton Review." At the time of his death he was engaged, in connection with Dr. Hodge, in preparing a commentary on the New Testament, of which "Notes on the New Testament Literature" and "The Gospel according to Matthew" have been published.

ALEXANDER, Ludwig Christian Georg Friedrich Emil, prince of Hesse, son of Louis II. of Hesse-Darmstadt, and brother of the present empress of Russia, born July 15, 1823. He served in the Russian army in the Caucasus, and distinguished himself in 1845 during the storming of Shamyl's residence. In 1851 he retired from the czar's service, and married the daughter of the late Russian general Count Hauke, who was raised to the rank of countess, and in 1858 to that of the princess of Battenberg. In 1852 he entered the Austrian service, took an active part in the war against Italy in 1859, and was charged by Francis Joseph to negotiate a truce with Napoleon III. In 1866 he commanded the 8th corps in the war against Prussia. He was repeatedly defeated, and was obliged to publish in 1867 his diary of the war in self-defence.

ALEXANDER, Stephen, LL. D., an American astronomer, born in Schenectady, N. Y., Sept. 1, 1806. He was educated at Union college and at Princeton theological seminary, was appointed tutor in the college of New Jersey in 1833, adjunct professor of mathematics in the same institution in 1834, professor of astronomy in 1840, of mathematics in 1845, and of mechanics and astronomy in 1854. In 1860 he went to the coast of Labrador at the head of an expedition to observe the solar eclipse of July 18. He has written many scientific papers, which have excited considerable interest, including one on the "Physical Phenomena attendant upon Solar Eclipses," read before the American philosophical society at their centenary meeting in 1843; one on the "Fundamental Principles of Mathematics," read before the American association for the advancement of science in 1848; one on the "Origin of the Forms and the Present Condition of some of the Clusters of Stars, and several of the Nebulæ," read at the meeting of the American association at Albany in 1850; and several communications to the same association relative to the "Form and Equatorial Diameter of the Asteroid Planets," and also on the "Harmonies in the arrangement of the Solar System, which seem to be confirmatory of the Nebular Hypothesis of Laplace."

ALEXANDER, William. **I.** First earl of Stirling, a Scottish poet, courtier, and speculator, born about 1580, died in 1640. He was the son of a private gentleman, was at an early age travelling tutor to the earl of Argyle, and about 1604 became attached to the court of James I., who in 1614 knighted him and appointed him gentleman usher to Prince Charles and master of requests. In 1621 he received a royal grant of Nova Scotia, and made strenuous efforts to sell it in parcels, issuing a glowing description of the country in a pamphlet entitled "An Encouragement to Settlers." To aid him, Charles I. in 1625 created the order of baronets of Nova Scotia, the title to be conferred upon purchasers of large tracts, and granted him the privilege of coining base copper money. According to Sir Thomas Urquhart, after selling 300 of these baronetcies, instead of 150, to which number they were to have been limited, and those who emigrated to the colony having failed to make a settlement, Alexander disposed of all rights and interests there to the French on his own account. He obtained from the king in 1628 a charter of the lordship of Canada, and from the council of New England a grant of territory, including Long Island under the name of the island of Stirling; and he had also received at different times royal grants of five baronies in Scotland. But notwithstanding all these favors, he died so involved that his family estates were given up to his creditors. He was appointed secretary of state in 1626, keeper of the signet in 1627, a commissioner of the exchequer in 1628, and an extraordinary lord of session in 1631. In 1630 he was created Viscount Stirling, and in 1633 earl of Stirling, Viscount Canada, &c. James I. called Alexander his philosophical poet. His works are numerous, and all didactic, heavy, and turgid, even when in the dramatic form. The principal are "Doomsday," in more than 10,000 lines, and "Four Monarchicke Tragedies," viz.: "Darius," "Julius Cæsar," "Crœsus," and "The Alexandræan Tragedy." His titles expired with the fifth earl, his last male descendant, in 1739, but several claimants have since arisen. **II.** A major general in the American revolutionary army, born in New York in 1726, died Jan. 15, 1783. Claiming the earldom of Stirling, to which many of his contemporaries believed him to be entitled, he is generally known in American history as Lord Stirling. Having received an excellent education, more particularly in mathematics, he attained a high reputation as a man of science. During the French and Indian war he was a member of the military family of Gen. Shirley, acting at different times as commissary, aide-de-camp, and secretary. After the close of the war he went to Scotland, where he spent a large portion of his fortune in the unsuccessful prosecution of his claims to the title and estates of Stirling. On the breaking out of the war of the revolution he was appointed colonel of a regiment, and while stationed at New York previous to the arrival of Washington from Boston, he fitted out an expedition consisting of a pilot boat and some smaller boats, with which he put to sea at night, eluding the vigilance of the sentinels of the British frigate Asia, which then lay in the harbor, and captured a transport laden with stores for the enemy at Boston. He opened the battle of Long Island, where, though he fought with obstinate bravery, he was compelled to surrender, after having secured the retreat of a large portion of his command. Having been exchanged, he fought under Washington at Brandywine, commanded the reserve at Germantown, and led a division at Monmouth. He died from an attack of gout. The name of Lord Stirling will always occupy an honorable place in American history, not only for his unquestioned patriotism and personal courage, but also for the part he took in exposing and defeating the designs of the "Conway cabal."

ALEXANDER OF APHRODISIAS (in Caria), surnamed the Expounder from his commentaries on Aristotle, flourished at the beginning of the 3d century of the Christian era. His most important work, "On Fate," in which he controverts the doctrine of necessity, was published by Orelli at Zürich in 1824. His other writings, mostly made up of notes upon Aristotle, were highly valued by the Arabs.

ALEXANDER ARCHIPELAGO. See supplement.

ALEXANDER BALAS, king of Syria from 150 to 146 B. C. He pretended to be a natural son of Antiochus Epiphanes, and his claim to succeed him was supported by the Romans and several of the princes of Asia. He defeated the troops of Demetrius Soter, and took possession of his throne, after which he abandoned himself to pleasure. Demetrius Nicator, son of Demetrius Soter, dethroned him and drove him into Arabia, where he was murdered by the chieftain with whom he had taken refuge.

ALEXANDER OF HALES, an English theologian, surnamed the Irrefragable Doctor, died Aug. 27, 1245. A great part of his life was passed at Paris, where he taught philosophy and theology.

In 1222 he became a Franciscan monk, and was the first of his order to retain his doctorate in the university. Bonaventura was his pupil, and perhaps also Aquinas. His chief work was his *Summa Theologiæ*, which, after being examined and approved by a committee of 70 doctors, was accepted as a complete manual of instruction in theology for all institutions of learning in Christendom.

ALEXANDER JANNÆUS, king of the Jews, of the house of the Asmoneans, from 105 to 78 B. C. (See Hebrews.)

ALEXANDER JOHN I., prince of Roumania, of the house of Cuza, born in Galatz, March 20, 1820. He was educated in Paris, became a colonel in the Moldavian service, and held several civil offices, resigning in consequence of disagreement with the government about the Austrian occupation. He was an active partisan of the union party, which favored the political union of the two Danubian principalities, and was hostile to Austrian influence. He was appointed minister of war in 1858, and elected prince of Moldavia Jan. 17, 1859, and of Wallachia Feb. 5. In October, 1860, he obtained the recognition of the sultan, and on Dec. 23, 1861, he proclaimed the union of the two principalities under the name of Roumania. He dissolved the national assembly March 14, 1863, abrogated the electoral law May 14, 1864, and promulgated a new and entirely arbitrary constitution. A conspiracy formed against him in 1865 was suppressed, but one instigated in 1866 by Bratiano, Ghika, Cantacuzene, and other eminent public men, put an end to his reign. On the night of Feb. 23 they sent officers to his house, who forced him to sign his abdication. A provisional government was proclaimed April 13, 1866. Prince Charles of Hohenzollern, a relative of the king of Prussia, was chosen reigning prince, and Alexander Cuza has since lived in retirement at Vienna.

ALEXANDER KARAGEORGEVITCH, a Servian prince, born at Topola, Oct. 11, 1806. After the execution of his father, Czerny or Kara George, at Belgrade in 1817, his mother went with him to Wallachia. He was for some time in the Russian military service, until permission was granted for his return to Servia, when he became aide-de-camp of the reigning prince, Michael Obrenovitch. After the downfall of the Obrenovitch dynasty, Alexander was elected prince of Servia, Sept. 14, 1842. This choice was ratified by Turkey, but not by Russia. Both governments sent commissioners to Servia, and on June 15, 1843, he was reëlected with the consent of the two powers. He promoted education and industry, and improved the civil and military service. He was soon accused, however, of leaning too much toward Turkey, especially during the Crimean war, when he prevented the national party from rising in rebellion against the Porte. The sultan rewarded his loyalty by confirming the privileges which he had granted to Servia, and by allowing the country to be placed, by the terms of the treaty of Paris of March 30, 1856, under the collective protection of the great powers, instead of, as previously, under the sole protection of the Porte. A conspiracy against him was discovered in 1857, and its two ringleaders, the presidents of the senate and the supreme court of Servia, Stefanovitch and Rayovitch, were sentenced to death, and their six accomplices to hard labor for life. The popular feeling against this sentence ran so high that the authorities durst not execute it, while Alexander incurred still greater odium by invoking the assistance of the Turkish authorities for the detection and punishment of the conspirators. He was called upon to resign; and on his retiring to the fortress of Belgrade, under the protection of Turkish guns, his expulsion from the throne and the country was decreed by the Servian national assembly (December, 1858), and Prince Milosh Obrenovitch, then an octogenarian, was reinstated. Milosh, on his death, Sept. 26, 1860, was succeeded by his son, Prince Michael Obrenovitch. Alexander, living in Hungary, constantly intrigued with Servian revolutionists and foreign schemers. A conspiracy instigated by them in 1864 was frustrated, but that of 1868 resulted in the assassination of Prince Michael (June 10), but not in the overthrow of the Obrenovitch dynasty. Milan (Obrenovitch IV.), Michael's cousin and adopted son (born in 1854), was proclaimed his successor under a regency. The murderers were arrested, and 15 of them, including two brothers of Prince Alexander, were at once put to death, while the prince himself, convicted of having planned and given money for the execution of the murder, was sentenced to 20 years' imprisonment by the court of Belgrade. His surrender being demanded, the Hungarian authorities ordered a new trial at Pesth, and the evidence was not deemed sufficiently strong for his conviction. He was not molested in Pesth for nearly 18 months, when another trial took place (1870), which again resulted in his favor. In January, 1871, this verdict was reversed by a court of appeal, and he was sentenced to eight years' close imprisonment and to payment of costs; but the sentence has not been executed.

ALEXANDER NEVSKOI, a Russian hero and saint, son of the grand duke Yaroslav II. of Novgorod and Vladimir, born in 1219, died in 1263. In his youth he fought against the Tartars, who, however, in 1238 succeeded in making Russia tributary. He was more successful in defending the northern boundaries against the encroachments of the Danes, the Swedes, and the knights sword-bearers. He won a great battle against the Swedes in 1240, on the banks of the Neva, near the modern St. Petersburg; hence his surname of Nevskoi. In 1243 he defeated the knights on the ice of Lake Peipus. On the death of his father in 1247 he became grand duke of Novgorod, and on that of his brother Andrew grand duke of Vladimir, and lord paramount of all the other sovereign Russian dukes. To an embassy from Pope Innocent IV., sent to unite the western and eastern churches, he answered: "We know the true teaching of the church; we will neither accept yours nor hear anything about it." The Russian church canonized him, and his name is preserved in the national songs. Peter the Great erected to his memory a great monastery on the spot where the battle on the Neva was won, and created the order of Alexander Nevskoi.

ALEXANDER SEVERUS, Roman emperor from A. D. 222 to 235, the son of Gessius Marcianus and Julia Mammæa, born at Arce in Phœnicia, in the temple of Alexander the Great, during the attendance of his parents there at a religious festival. The date of his birth is uncertain, but most historians ascribe it to the autumn of 205. His original name was Alexianus Bassianus. On the elevation of his cousin Elagabalus to the purple, he accompanied his mother to Rome. In 221 he was adopted by the emperor, and created Cæsar, pontiff, consul elect, and *princeps juventutis.* He now assumed the name of Marcus Aurelius Alexander. Elagabalus soon regarded him as a rival whose destruction was essential to his own safety; but Alexander's life was preserved by the watchfulness of his mother and the affection of the soldiers, who ultimately avenged his injuries by sacrificing his enemy. On the death of Elagabalus he was proclaimed emperor by the prætorians, and the choice was confirmed by the senate. He now took the appellation of Severus, as he was ambitious of being thought a descendant of the emperor Septimius Severus. During nine years of peace he reformed abuses, promoted men of merit and capacity, and restored health to the empire. In 231, however, he assumed command of the eastern legions to defend his Asiatic provinces from a Persian invasion. Crossing the Euphrates, he encountered the hostile hosts in Mesopotamia, and defeated them with great slaughter. Receiving intelligence that the Germans were up in arms and preparing for an irruption into Gaul, he hastened back to place himself at the head of the Rhenish army; but at the very opening of the campaign he was waylaid and slain, along with his mother (to whose care his elevated character, in the midst of corruption, is attributed), by a party of mutineers, who had probably been instigated to the deed by his successor Maximin.

ALEXANDRE, Aaron, a chess player, born at Hohenfeld, Bavaria, about 1766, died in London, Nov. 16, 1850. He was for some time rabbi at Fürth, and afterward teacher of German at Paris, where he established a boarding school. His *Encyclopédie des échecs* (Paris, 1837), and his *Collection des plus beaux problèmes d'échecs* (Paris, 1846), established for him a high reputation as an authority on chess. He was among the first chess players of the century, and in his 80th year continued to be a thorough master of the game. In France and in Europe generally he was known among chess players as "Father Alexandre."

ALEXANDRETTA (Turk. *Iskanderun;* anc. *Alexandria ad Issum*), a Turkish seaport on the N. coast of Syria, in the vilayet of Aleppo, situated on the E. side of the bay of Iskanderun, in lat. 36° 35′ N., lon. 36° E., 23 m. N. of Antioch; pop. about 1,000. Though much improved of late years, especially by the drainage of a pestilential marsh in its rear, it is still a wretched and unhealthy village. The harbor is capacious, and the town has considerable commercial importance as the port of Antioch and Aleppo. The products of northern Syria and Mesopotamia, consisting of grain, oils, soaps, gallnuts, wool, cotton, tobacco, &c., and European manufactures, pass through this port. English capitalists have projected a railroad from this port through the valley of the Euphrates to the Persian gulf, to be ultimately extended N. W. to Constantinople.—Alexandretta was founded by Alexander the Great to commemorate his victory over Darius III. in 333 on the neighboring plains of Issus. In 1097 it was taken by Tancred; and in 1832 it was the scene of a victory by the army of Mehemet Ali over the Turks.

ALEXANDRIA, a N. E. county of Virginia, on the Potomac, opposite Washington; area, 36 sq. m.; pop. in 1870, 16,755, of whom 7,310 were colored. It was once a part of the District of Columbia, and was retroceded to Virginia by act of congress in 1846. Its surface is hilly and its soil is poor and thin. The staple products are corn, wheat, oats, and hay.

ALEXANDRIA, a port of entry and capital of Alexandria county, Va., on the right bank of the Potomac, 7 m. below Washington; pop. in 1860, 12,652; in 1870, 13,570, of whom 5,300 were colored. The Potomac is here a mile wide, forming a harbor able to accommodate the largest ships. The city is generally well paved and lighted with gas, and water has been introduced by machinery. It is connected by a railroad 90 m. long with the Chesapeake and Ohio railroad at Gordonsville, and has a railroad to Leesburg, 40 m. distant, and one to Washington connecting with the Baltimore and Ohio railroad. It also has a canal joining the Chesapeake and Ohio canal at Georgetown. The imports from foreign countries in 1870 amounted to $38,822, and the exports to $39,648; 24 vessels were entered from foreign countries with a tonnage of 5,697 and crews of 192 men; 4 vessels with a tonnage of 1,029 were cleared for foreign countries. The number of vessels registered, enrolled, and licensed was 128, with a tonnage of 7,646. Two daily newspapers with tri-weekly editions and one monthly are published here.—The city of Alexandria belongs to the territory ceded by Virginia in 1789 to the Union as part of the District of Columbia, and retroceded in 1846. At the opening of the civil war Alexandria was in possession of the confederates. On the 24th of May it was entered

Alexandria, Egypt—Mehemet Ali Square.

by the Union forces under Col. Ellsworth, who was shot while hauling down a confederate flag. It was subsequently the seat of government of the few counties of eastern Virginia which adhered to the Union, being occupied by the federal army, and recognized Francis H. Pierpont as governor of the state.

ALEXANDRIA, a town, capital of the parish of Rapides, La., on the Red river, about 50 m. (direct) from its junction with the Mississippi; pop. in 1870, 1,218, of whom 448 were colored; in 1860, 1,461. It is the shipping point of a rich cotton country.—When the Shreveport expedition of Gen. Banks and Admiral Porter was descending the river in April, 1864, the fleet, owing to low water, was unable to pass the falls at Alexandria, and the destruction or capture of all the vessels, valued at nearly $2,000,000, seemed inevitable. In this emergency Lieut. Col. Joseph Bailey, engineer of the 19th corps, proposed to construct a dam across the channel of the river—here 758 feet wide, 4 to 6 feet deep, and running at the rate of 10 miles an hour—a short distance below the falls. Eight days' work had nearly completed the dam, and the water had risen enough for all except the largest vessels to pass, when a portion of the work gave way. Admiral Porter immediately ordered the four smaller vessels of the fleet to pass through the breach, which, though attended with great danger, was successfully accomplished. Several wing dams directly at the head of the falls were now constructed, raising the water on the rapids more than a foot additional, when the rest of the fleet passed safely down. The town was nearly destroyed by an accidental fire on the day of its evacuation by the federal troops, May 13 following.

ALEXANDRIA (Turk. *Iskanderiyeh*), a city of Egypt, on the Mediterranean, 112 m. N. W. of Cairo, founded by Alexander the Great after the destruction of Tyre, 332 B. C. Dinocrates or Dinochares was the architect, and the site selected was at the Canopic mouth of the Nile, between the sea and Lake Mareotis. The city was regularly laid out and intersected by two main streets, upward of 100 feet wide, running from N. to S. and from E. to W. respectively. On the island of Pharos a lighthouse of vast height was erected, and this island itself was connected with the mainland by a dike which divided the inner from the outer harbor, and through which vessels could pass by means of movable bridges. The east end of the town was called the Bruchium, and here was the royal palace of the Ptolemies. Under them Alexandria was the great centre to which the trade of Europe and the Mediterranean with Persia and the far east converged. It numbered about 300,000 free inhabitants, of various nationalities, and also became the centre of universal learning. Here the schools of Grecian philosophy, and especially the Platonists, flourished. Among its ornaments were its library and the museum, an establishment in which scholars were maintained at public cost. In Alexandria the Scriptures were first made known to the heathen by the Septuagint version, and here Christianity early took root, although the city soon became the scene of rancorous and unchristian disputation and violence. In no place were religious conflicts more frequent or more sanguinary. It also witnessed much political strife, suffering especially during the struggle of Cleopatra with her brother Ptolemy (Cæsar's Alexandrine war). In 30 B. C. it fell permanently under the power of the Romans; and, notwithstanding the removal of many of the most precious works of art to Rome, its greatness continued till the establishment of the seat of empire at Constantinople. From the rise of Constantinople, though still a centre of commerce, Alexandria as a capital began seriously to decline. In A. D. 640 it was taken by the Saracens under Amru, the general of the caliph Omar, and in 969 Cairo was founded by the caliphs of the Fatimite dynasty, and made the capital of Egypt. The discovery of the route to India and the East by the Cape of Good Hope completed its decay. At present the underground cisterns for the preservation of the Nile water are the only perfect relics of the past.—Modern Alexandria is situated on the causeway which once formed the communication between the mainland and the Pharos, and which by constant accumulation of sand and material is now formed into a neck of land. There are two ports, one at the extremity of an extensive roadstead west of the Pharos, in which vessels of the line may lie; the other, the modern port, on the east of the Pharos, is less advantageous. Lake Mareotis was dried up by accumulations of sand, but in 1801 the British army cut through the narrow strip which separated it from the lake of Aboukir, and let in the sea again. Alexandria is fast becoming as populous as it was in the days of antiquity, and looks (1873) rather like an Italian than an oriental city. The ruins of the ancient city and the wretched habitations of the Arabs are no longer as conspicuous as they were formerly. Large streets well paved and lighted with gas are seen in the European quarter, and abound with fine residences. The great promenade of the Mehemet Ali square, formerly the square of the Consuls, is the central and most animated point of the city. The population was estimated in 1870 at 238,888, including, besides Arabs, Copts, Turks, Persians, Armenians, and Jews, 25,000 Greeks, 20,000 Italians, 15,000 French, 12,000 English Maltese, 12,000 Levantines of miscellaneous European descent, 8,000 Germans and Swiss, 8,000 various foreigners, comprising a number of American officers in the khedive's army and American engineers and missionaries. Railways connect the city with Cairo and the Suez canal and with Ramleh. It is as a place of transit for passengers that Alexandria is most remarkable, the steamers to and from India, the Mediterranean, and the Levant all contributing to the prosperity of the city. In 1869 there were 56,000 passengers in the 2,000 sailing ships, and nearly 80,000 in the 1,000 steamers which entered the port, besides men-of-war.

ALEXANDRIAN CODEX, an uncial manuscript of the Old and New Testament, so named from the fact that it was found at Alexandria by Cyrillus Lucaris, the patriarch of Constantinople, who presented it in 1628 to Charles I. of England. It was written on vellum, in double columns, condensed and unaccented. It contains, besides the canonical books, slightly varied in their order, most of the apocrypha. Some writers have been of the opinion that the writer of this codex followed three different editions—the Byzantine in the gospels, the western in the Acts and catholic epistles, and the Alexandrine in the epistles of Paul—and therefore speak disparagingly of its authority. Others consider it the most perfect copy of the Scriptures extant. The famous passage concerning the three witnesses (1 John v. 7) is not contained in this codex; and there are several chasms in the text, more especially in the New Testament. A portion of the gospels of St. Matthew and of St. John, as well as of the Second Epistle to the Corinthians, is wanting. On the first page of the text of Genesis is a declaration that the MS. was dedicated to the use of the patriarch of Alexandria, and an anathema of excommunication against him who shall remove it from the library. Cyrillus, the donor of the MS. to Charles, was a patriarch of Alexandria before his removal to Constantinople. By some he has been accused of forgery in this whole matter. The MS. is in very good condition generally. It is the only one known which contains the genuine epistle of Clement to the Corinthians. This codex is now preserved in the British museum.

ALEXANDRIAN LIBRARY, a collection of books formed by Ptolemy I. and Ptolemy II. of Egypt, and probably the largest prior to the invention of printing. It was founded, it is said, at the suggestion of Demetrius Phalereus, who, when a fugitive at the Egyptian court, spoke with admiration of the public libraries at Athens. Demetrius was appointed superintendent, and diligently employed himself in the collection of the literature of all nations, Jewish, Chaldee, Persian, Ethiopian, Egyptian, Greek, Roman, &c. According to Eusebius, there were 100,000 volumes in the library at the death of Ptolemy Philadelphus; and subsequently the number was increased to 700,000. The *volumina* or rolls, however, contained far less than a printed volume; as, for instance, the "Metamorphoses" of Ovid, in 15 books, would be considered as 15 volumes. During the siege which Cæsar stood in Alexandria, a large part of the library was burned. Gibbon asserts that the old library was totally consumed, and that the collection from Pergamus, which was presented by Mark Antony to Cleopatra, was the foundation of the new one, which continued to increase in size and reputation for four centuries, until dispersed by Theophilus, patriarch of Alexandria, at the destruction of the Serapeum, about A. D. 390. Still the library was reëstablished; and Alexandria continued to flourish as one of the chief seats of literature until it was conquered by the Arabs in 640. The library was then burned, according to a story of very questionable authenticity, in consequence of the fanatic decision of the caliph Omar: "If these writings of the Greeks agree with the Book of God, they are useless and need not be preserved; if they disagree, they are pernicious and ought to be destroyed." Accordingly, it is said, they were employed to heat the 4,000 baths of the city; and such was their number, that six months were barely sufficient for the consumption of the precious fuel. There is no doubt, however, that after 640 the library ceased to exist as a public institution. Connected with the library was a college, or retreat for learned men, called the museum, where they were maintained at public expense.

ALEXANDRIAN SCHOOL, a term vaguely applied to a development of Neo-Platonism by the philosophers of Alexandria in Egypt about the end of the 2d century. The characteristic of the school was a broad eclecticism based upon the rationalism of Plato and largely influenced by the supernaturalism of the Grecianized Jews. Afterward the early teachers of Christianity modified it still more by an admixture of Aristotelianism, and it became a transition system between the pagan and Christian beliefs, aiming to harmonize all philosophy and all religion. The earliest philosopher of this school was the Jew Philo, but it first took decided form from Ammonius Saccas, about 193. The other chief names identified with it are those of Plotinus, Porphyry, Iamblichus, Hierocles, Proclus, Pantænus, Clement, Origen, Athanasius, Gregory Nazianzen, and Cyril. Of these, Philo represents the Judaistic extreme, while Clement is the great Christian Alexandrian.—The history of the Alexandrian school has been written by Matter (2 vols., Paris, 1840–'44) and Simon (2 vols., Paris, 1844–'5). See also *De l'école d'Alexandrie*, by Barthélemy Saint-Hilaire (Paris, 1845).

ALEXANDRINE, or **Alexandrian,** in poetry, a metre consisting of 12 syllables, or 12 and 18 alternately; so called, according to some, from a poem on the life of Alexander written in this kind of verse by a French poet of the latter half of the 12th century. The French have ever since cultivated this species of verse more than any other European nation. Their tragedies are mostly composed of Alexandrines. In his "Essay on Criticism," Pope gives the English opinion of them:

A needless Alexandrine ends the song,
That like a wounded snake drags its slow length along.

ALEXANDROPOL (formerly *Gumri*), an important fortress and town in Russian Armenia, near the frontier of Turkey, 54 m. N. W. of Erivan; pop. in 1870, 17,272. Near it the Russians under Bariatinski obtained on Oct. 80, 1853, a great victory over the Turks.

ALEXANDROV, a town of Russia, in the government of Vladimir, 58 m. N. E. of Moscow, on the river Seraya; pop. in 1870, 5,810. It contains dye works and manufactories of iron ware and muskets. Among the many churches is one with a nunnery and the tombs of Martha and Theodosia, two sisters of Peter the Great. The czar Ivan II. Vasilievitch established here the first printing press introduced into Russia, and in 1560 made the town the capital of his newly founded dominion of Opritchina. Near the town is an extensive imperial stud of horses founded by the empress Elizabeth in 1761 and completed in 1781, famous for the variety of the breeds.

ALEXANDROVSK, a town of Little Russia, on the left bank of the Dnieper, below its cataracts, in the government and 48 m. S. of Yekaterinoslav; pop. in 1870, 4,601. It is the place of shipment by the Dnieper for the Black sea, though the trade might be much more active considering the excellent situation of the town. The district of Alexandrovsk formerly contained the lines of fortifications from the Dnieper to the sea of Azov, established in 1770 against the Tartars. The neighboring village of Stilja is noted for its extensive coal mines. Many settlements of foreigners, chiefly Germans, are in this district.

ALEXEI, the Russian form of Alexis. See ALEXIS.

ALEXIS (or **Alexius**) **I., Comnenus,** emperor of Trebizond (Trapezus), born in 1182, died in February, 1222. The enmity of Isaac Angelus to the family of the Comneni threatened the entire extermination of that illustrious house. The sons of the last Comnenian emperor of Constantinople, John and Manuel, were by his command mutilated and murdered in prison. The latter, however, left two infant sons, Alexis and David, who fled with their mother to their relative Thamar, the Georgian queen of Tiflis, by whom they were protected and educated. They gradually formed a dominion on the banks of the Phasis, which the distracted government of the Angeli failed to suppress. On the second capture of Constantinople by the Latins, in 1204, Alexis and his brother rallied around them numerous discontented Greeks, left their retreat, and passed the Phasis. Alexis captured Trebizond, Cerasus, and Mesochaldion, and took possession of all that coast of the Black sea as far as Amisus, while David advanced beyond the Halys, took Sinope, and pushed his conquests to the environs of Constantinople. Alexis now assumed the imperial title, proclaiming himself king and ruler of all Anatolia. His reign was troubled by perpetual wars with the Turks, and with Theodore Lascaris, who having, like Alexis, become master of a fragment of the empire, was entitled the emperor of Nicæa. In 1214 Alexis concluded a peace with Theodore, but the same year fell into the hands of the sultan of Iconium, and purchased his liberty by yielding to the Turks the town and district of Sinope. His empire at his death was reduced to the coast of the Black sea, comprised between the Phasis on the east and the Thermodon on the west.

ALEXIS (or **Alexius**) **I., Comnenus,** emperor of Constantinople, born in 1048, died Aug. 15, 1118. He was the son of John Comnenus, who refused the succession bequeathed to him by his brother Isaac. Alexis in his youth served the emperor Michael VII. in the Turkish war, and against the rebel Nicephorus Botaniates. He was one of the most faithful adherents of Michael till he was deposed by his rebel enemy, when he offered his services to the new emperor. Nicephorus bestowed honors upon him, and charged him with restoring the peace of the empire, then disturbed by many rebellions. Alexis triumphed over the most powerful leaders of revolt, Bryennius and Basilacius, but his victories excited the jealousy of the emperor and the envy of the courtiers; and when he refused to march against a new rebel, the husband of his sister, his destruction was resolved upon. Escaping by the protection of the empress to the army, of which he was the favorite, he was immediately proclaimed emperor by the soldiers, captured Constantinople in 1081, and gave it up to pillage. Nicephorus was permitted to retire to a convent. Alexis found the empire in internal discomposure, and surrounded by enemies. On the east the Seljuk Turks, overrunning the provinces of Asia, had spread from Persia to the Hellespont; on the west, the Normans, under Robert Guiscard, after brilliant successes in Italy, were advancing eastward; and new swarms of barbarians from the north, having crossed the Danube and occupied Thrace, had several times defeated the imperial troops. The first measure of Alexis was to conclude a peace with the Turks by abandoning to them the provinces of which they already had possession. Heavy exactions and spoliations of the churches furnished him the means to at once raise an army of 70,000 men, with which he marched for the deliverance of Durazzo, besieged by the Normans. His treaty with the sultan had procured him an auxiliary force of some thousand Turks, and he had even succeeded in enlisting under his banner some of the wild Transdanubians. The battle was fought Oct. 18, 1081; and the Normans, led by Robert and his wife Gaita, gained a complete victory. Robert was now obliged by a revolt of his vassals to return for a time to Italy, which gave Alexis leisure to repel the incursions of the Turks. By means of his navy he contended with doubtful success against them till 1095, but was in despair when he learned that the Turks had availed themselves of the art of some Greek prisoners to build a fleet, with which they were approaching Constantinople. He now addressed himself for aid to the West, declaring that the existence of Christendom was threatened by this new eruption of barbarians. The capture of Jerusalem by the Moslems, the preaching of Peter the Hermit, and the activity of Pope Urban II., produced a meeting of the Christian princes at Piacenza. The ambassadors of Alexis contributed much toward deciding the princes to join the first crusade. Alexis had thought only of a moderate succor from the West; when therefore in 1096 the promiscuous armies of the crusaders began to arrive, numbering untold hosts, and led on by the most renowned leaders of Europe, his fears were quite as great as his hopes, and he was glad to give them a quick passage into Asia, where at first the Turks found little difficulty in annihilating them. Godfrey of Bouillon and Hugh, count of Vermandois, encamped during the winter in the environs of Constantinople, and it was only by a skilful display of his military forces that the emperor felt his capital safe. He failed to give them the assistance which he had promised, and in 1097 demanded from the chiefs of the crusade that they should restore to him his ancient possessions in Asia, and should do homage to him for all the territory which they conquered out of certain prescribed limits. They consented, though Bohemond, the son of the emperor's old enemy Robert Guiscard, long refused, and Tancred passed over into Asia to avoid the public ceremony of doing homage, at which Count Robert of Paris insulted before the world the imperial majesty. Harmony never existed between Alexis and the leaders of the crusades; and though he rendered them important assistance in the siege of Nicæa, and by their aid recovered some important towns of Asia Minor, and the islands of Rhodes and Chios, yet by abandoning the Christians before Antioch, he so outraged Bohemond that that prince returned to Europe, increased his army, and began to wage war in Thrace against Alexis. He, however, gained but slight successes, and soon made peace. In the last years of his life Alexis continued to war against the Turks, and defeated them in great battles in 1115 and 1116. Alexis was an able ruler, valiant, active, and politic; but he was also dissembling and hypocritical.

ALEXIS, Willbald. See HÄRING.

ALEXIS MIKHAILOVITCH, second czar of Russia of the Romanoff lineage, born March 10, 1629, succeeded his father Michael Fedorovitch July 12, 1645, died Jan. 29, 1676. During the earlier years of his reign he had for advisers his tutor, Morozoff, and the grand chancellor Plesoff. An insurrection broke out against his counsellors, and Plesoff was slain. Next (1648) appeared two pretenders to the crown: one calling himself Dimitri (the last pretender who took that name), the other a certain Ankudinoff, calling himself a son of the czar Basil Shuiskoi. Alexis put them down, and afterward proved himself one of the best sovereigns who ever occupied the Russian throne. His reign marked the dawn of that civilization which his son Peter the Great more widely diffused over Russia. He encouraged learning, fostered printing establishments, attracted to Russia from abroad men of letters, artists, physicians, manufacturers, and operatives. He was active, intelligent, and temperate. To break the pride of the princes and boyars, who refused generally to obey the orders of a military or civil superior when the date of his title was later than their own, Alexis ordered these rebels to deposit all the documents relating to their rank in the chancery of the imperial council, and then burned them together with the old nobiliar record of the empire, called the Velvet Book. Under his reign Russia for the first time began to have the advantage over the Poles, whom he defeated in two wars. By the treaties of Moscow (1656) and Andruszow (1667) Alexis recovered several provinces formerly taken from Russia. He was also for several years at war with Sweden, which ended with an armistice in 1658 and a treaty in 1661, mutually guaranteeing their former possessions. During his reign the Cossacks of the Ukraine, for centuries tributaries of Poland, seceded and submitted to Russia. He was twice married, and left children by both wives. The first was a Miloslavska, of a Russian boyar family; the second a Naryshkin, a person of lower rank, whom Alexis chose from the sight of her shoe, which made him think she had a very small foot. She was the mother of Peter the Great.

ALEXIS PETROVITCH, the eldest son of Peter the Great and of Eudoxia Lapukhin, born in Moscow, Feb. 18, 1690, died July 7, 1718. Surrounded from childhood by the relations of his mother, he was the centre of all those who were, like her, averse to the reforms introduced by his father. He affected a fanatic love of old Russian customs and superstitions, and Peter decided to exclude him from the throne. Alexis, then about 22 years old, seemingly consented to this plan, saying it was his wish to become a monk. He entered a monastery, but still kept up his intercourse with the malcontents, with his mother, who had likewise been shut up in a convent, and with her numerous dissatisfied relations. During the travels of Peter through various European countries in 1717, Alexis announced that he had received the order of his father to join him abroad. He thus managed to escape to Vienna, where he claimed the protection of the German emperor, and thence he went to Naples. Peter sent after the fugitive Rumiantzoff, captain of the guards, and Tolstoi, the privy councillor, who, partly by coaxing, partly by menaces, succeeded in bringing him back to St. Petersburg. On Feb. 2, 1718, Peter disinherited Alexis, impeaching him and many of his kindred and advisers for high treason. He was found guilty by the great council of the empire and condemned to death. Peter pardoned him, but he died July 7, 1718, a few days after the condemnation, some say from fear and excitement; but the more general belief is, that he was either poisoned or secretly beheaded by the order of his father. Peter himself published the proceedings of the trial. Alexis, when very young, was married to a princess of Wolfenbüttel, who died in 1715, leaving a daughter, and a son who reigned afterward as Peter II.

ALFANI, the name of two Italian painters, Domenico di Paris, born in Perugia about 1483, died after 1540; and Orazio di Paris, son of the former, born in Perugia in 1510, died in 1583. Their pictures have often been confounded with each other, and also mistaken for those of Raphael.

ALFARABIUS, an Arabian philosopher, died about 950. He travelled, acquired the knowledge of a large number of languages, and settled at Damascus, where he was joyfully received by the Abbasside caliph, who settled a pension upon him. He led an extremely temperate life, approaching asceticism. His writings were very voluminous and comprehensive, and he is reputed to have been the first who attempted the compilation of an encyclopædia, the MS. of which is in the Escurial.

ALFIERI, Vittorio, count, an Italian tragic poet, born at Asti, Piedmont, Jan. 17, 1749, died in Florence, Oct. 8, 1803. He received a very imperfect education at the college of nobles in Turin, which was terminated by his entrance at the age of 17 into the army. As his regiment was a provincial one, from which only a few days' service at stated annual periods was required, he easily obtained the royal assent to an extended leave of absence for the purpose of travel. With ample wealth, a restless and excitable temperament, and a keen appreciation of the pleasures of life, he passed several years in wandering over the continent, and in 1773 returned to Turin. This period of travel was without any considerable benefit to him, being spent in a great measure in frivolous dissipation, and at the age of 25 he had given no hint of any dramatic talent or literary ability. Chance seems to have led him, while watching at the sick bed of his mistress, to sketch a few scenes in Italian between Antony and Cleopatra. Crude as these necessarily were, the occupation developed his latent powers and gave the first impulse to literary composition. It awakened in him also the desire to lead a more profitable and reputable life. "Cleopatra" was gradually finished, and, together with a farce called "The Poets," was in 1775 produced with considerable success on the stage. His labors on these pieces having revealed to him his ignorance of the structure and resources of his own language, at the age of 27 he deliberately set about educating himself in Italian. A year or two of study in the society of learned men sufficed to familiarize him with the works of the classic writers of Italy, ancient and modern, and in 1777 he returned with enthusiasm to his dramatic labors. At this time he met the beautiful and accomplished countess of Albany, the ill-treated wife of Charles Edward Stuart, pretender to the English crown. For this lady he conceived an absorbing passion, and the desire to win her approbation stimulated his genius to higher efforts. To be near her he took up his residence in Florence, having first settled the bulk of his fortune upon his sister, while reserving to himself an annuity; and during the next few years he labored with an energy and success which fairly redeemed the lost opportunities of his youth. By the year 1782 he had produced 14 dramas. In 1785 he followed the countess to France, and upon the death of her husband in 1788 is believed to have been married to her in that country, although the relation was never publicly acknowledged, and there is no positive evidence to sustain it. He continued to reside in France, and was engaged in superintending the publication of an edition of his works in Paris when the French revolution reached its first alarming crisis. Compelled to flee the country, with the loss of almost everything he had possessed there, he returned to Florence, where, in the society of the countess of Albany, he passed the remainder of his life. His latter years were clouded by various troubles, but he still pursued his literary labors. He wrote satires, panegyrics, and sonnets, translated Virgil and Terence, and when nearly 50 years of age began the study of Greek. He died of an attack of gout, tenderly cared for to the last by the countess of Albany, who caused a monument, sculptured by Canova, to be erected over his remains in the church of Santa Croce. His dramatic works comprise 21 tragedies, 6 comedies, and a "tramelogedia," a name invented by himself. He also produced translations from the Greek dramatists, an epic poem in four books, a treatise on tyranny, and a number of satires and lyrical pieces, including five odes on the American revolution. After his death appeared his *Misogallo*, a collection of satirical pieces in prose and verse, inspired by a lively hatred of the French nation; and his autobiography, in which he records with singular frankness the story of his life.—Alfieri's reputation rests almost exclusively upon his tragedies. Their literary rank is permanent. Remarkable for a vigor and intensity of expression worthy of the best days of Italian literature, their classic subjects and stern outline, however opposed to the romantic school, have a grand and solemn charm. Though simple to meagreness in construction, and admitting of little by-play or scenic effect, they are said to hold an Italian audience spell-bound by the nervousness of the language and the condensed energy and passion with which the higher passages are infused. *Saul*, *Mirra*, *Oreste*, and *Filippo* are considered the best. To Alfieri belongs the distinction of having founded the Italian school of tragedy. Avoiding pedantic obedience to Greek or French models, he embodied the earnestness of the one and the modern form of the other in the language of his country. He was a man of strong likes and dislikes and a violent temper, but candid, independent, and generous to a fault. Two marked peculiarities of his character were his detestation of the French and his fondness for horses. He was a liberal in politics, although his faith in democracy is supposed to have been somewhat shaken by the excesses of the French revolutionists; he hated kingcraft, and prized his own nobility chiefly that he was free to abuse it. Two editions of Alfieri's complete works have been published—22 vols. 4to, Pisa, 1808, and 22 vols. 8vo, Padua, 1809–'10. The best edition of his tragedies, autobiography, and some of his minor works, is contained in the Milan collection of the Italian classics, entitled *Opere scelte* (4 vols. 8vo, 1818).

ALFONSO, the name of several kings of Spain and Portugal, also written ALONSO, ALONZO, ALPHONSO, and in Portuguese AFFONSO. There were five in Aragon, six in Portugal, and twelve in Leon and Castile. The kingdom of Leon is generally considered to have commenced with **Alfonso I.,** the Catholic, who was elected about 739 king of Asturia, subsequently called the kingdom of Leon and Oviedo, and died in 757. He carried on a war of extermination with the Moors.—**Alfonso II.,** the Chaste, grandson of the preceding, elected king in 791, died in 842. He is famous in the national annals for having abolished the annual tribute of 100 Christian maidens to the Moors. In his reign lived the great Bernardo del Carpio, the hero of Spanish romance.—**Alfonso III.,** the Great, son of Ordoño I., born in 848, king in 866, died in 912. He extended the limits of the Christian rule to the Guadiana, put down a rebellion fomented by discontented nobles in favor of his son Garcia, but afterward abdicated, and won a victory over the infidels as general of his son's troops.—**Alfonso VI.,** the Valiant, son of Ferdinand I., born in 1030, succeeded to the throne of Leon in 1065, and died in 1109. Under the preceding reign the kingdoms of Leon and Old Castile had been united, and after much internal warfare with his brothers, among whom the father had parcelled out the kingdom, Alfonso made himself master of Leon, Old Castile, the Asturias, and Galicia. His successes against the Moors led to the invasion of the peninsula by the Almoravides from Africa, against whom Alfonso furnished assistance to his old enemy the king of Seville, but ineffectually. Rodrigo Diaz de Bivar, the celebrated Cid, lived in this reign. Alfonso VI. died without heirs male, and the united crowns fell to his daughter Urraca. She married Alfonso I. of Aragon, who in her right claimed the crown of Castile and Leon. The marriage was, however, dissolved on account of Queen Urraca's misconduct.—**Alfonso VII.** or **VIII.** (see ALFONSO I. of Aragon), RAIMONDEZ, son of Queen Urraca and her first husband, Count Raymond of Burgundy, born in 1105, died in 1157. He was proclaimed king of Galicia in 1109, was for some time at war with his mother, and succeeded her in Leon and Castile in 1126. In 1135 he was crowned emperor of Spain, though he hardly possessed a third of it, and did not transmit the title.—**Alfonso X.,** the Wise, king of Leon and Castile, born in 1226, succeeded his father Ferdinand III. in 1252, and died in 1284. He compelled the king of Granada to do homage to the crown of Castile, and to pay a considerable sum of money. In 1256 Alfonso was chosen by some of the electors emperor of Germany, while Richard of Cornwall was supported by others; but his power in Germany remained a mere shadow, and in 1273 Rudolph of Hapsburg put an end to the interregnum. His reign was disturbed by the revolt of his brother Philip and Alhamar, king of Granada, an invasion by the king of Morocco, and a civil war caused by the claim of his second son Sancho to be recognized as heir to the throne. Sancho was excommunicated by the pope and the kingdom placed under an interdict. Alfonso was one of the most learned men of his age. He laid the foundation of Spanish prose by causing a translation of the Bible to be made into that language, by ordering all legal proceedings to be conducted in it, and by the excellent specimens which he himself gave of it in his writings. He is also distinguished as a poet and as a man of science. He is best remembered, however, for his celebrated body of laws, known usually as *Las siete Partidas* ("The seven Parts"), but named by its author the *Setenario*, from a code begun by his father. The materials for this work were drawn from the code of Justinian, the Visigothic laws, the local institutions of different parts of the kingdom, and other sources. Its enforcement was long resisted by the great cities, but it was at last in 1348 established on a firm footing, and has been ever since the basis of Spanish common law, and has even, by the admission of Florida and Louisiana into the United States, been introduced into the legal system of our own country. Another important work of which Alfonso is the author is the *Crónica general de España* ("General Chronicle of Spain"). He established on a firm basis the university of Seville, and was eminent for his astronomical and mathematical attainments, and for his researches in alchemy. The celebrated astronomical tables which bear his name were probably constructed by Moorish astronomers invited to his court for that purpose. His astronomical works have been published in several volumes by the Spanish government, edited by Manuel Rico y Sinobas (1864 *et seq.*).

ALFONSO XII. See p. 812.

ALFONSO I., king of Aragon and Navarre, surnamed el Batallador (the battler), son of Sancho V., succeeded his brother Pedro I. in 1104, died in 1134. He married Urraca, daughter of Alfonso VI. of Leon and Castile, and in her right claimed the sovereignty of those states also, and is sometimes counted as Alfonso VII. of that line. The first years of his reign were distracted by violent quarrels and wars with his wife, whom he finally divorced in 1114. The Moors under Ali ben Yusuf invaded the province of Toledo, and carried terror to the gates of the capital of Christian Spain; a second army appeared in Portugal; and a third laid siege to Barcelona. Alfonso fought an indecisive battle with these last in 1111, after which they abandoned Catalonia. Subsequently he directed his arms against the invaders in other quarters, and rescued almost all the territory S. of the Ebro from Mohammedan domination. He took Saragossa (1118) after a four years' series of operations, and made it his capital. In 1125 he invaded Andalusia at the invitation of the Mozarabes, or Christian inhabitants of that country; and though he failed in the siege of Granada, he performed the remarkable feat of leading an army through hostile territory from Saragossa to the Mediterranean, somewhere between Málaga and Almeria, and back again, without serious loss. On the death of his divorced queen he made preparations to enforce his claims in Castile, but was persuaded by the church to agree to a truce and renounce the title of emperor of Spain, which he had assumed. He finally undertook to secure the free navigation of the Ebro by reducing the Moorish city of Tortosa near its mouth. As a preliminary to this enterprise he besieged Fraga, on the Ciuga, an affluent of the Ebro, and was there slain in battle—the only engagement, it is said, in which he was ever vanquished.

ALFONSO V. of Aragon, and I. of Naples and Sicily, surnamed the Magnanimous, born about 1390, died June 27, 1458. He succeeded his father Ferdinand I. in 1416, and the first act of his reign displayed the generosity of his character. Having received a list of nobles who were conspiring to dethrone him, he tore the paper in pieces without reading it. In the early part of his reign he left Spain to make good his claims to the sovereignty of the islands of Sardinia and Corsica, which were then partly in the power of the Genoese. In the war which followed he met with some success, but soon relinquished this project for more dazzling schemes of ambition. Joanna, queen of Naples, being attacked by Louis III., duke of Anjou, sent to Alfonso, offering to make him duke of Calabria and heir to the throne of Naples if he would aid her against the duke of Anjou. Alfonso eagerly accepted this proposition, abandoned Sardinia and Corsica, over which his sovereignty thenceforth amounted to but little, and, sailing to Naples, obliged the duke of Anjou to raise the siege, and make a peace on terms advantageous to the queen. But Joanna became jealous of the power of her new ally, and open war broke out between them. The queen summoned to her aid Sforza Attendolo, the general of the duke of Anjou, who defeated Alfonso. The latter was soon enabled by the arrival of fresh troops from Spain to make himself master of the city of Naples, and to hold his enemies in check. But his presence was now required in Spain to protect his kingdom of Aragon, then at war with Castile. Accordingly, leaving his brother Don Pedro in charge of his affairs in Italy, he sailed for Spain in 1423. On his way thither he made a descent on Marseilles, then belonging to the duke of Anjou, captured the city without difficulty, but neither sacked it nor carried away from it any booty, with the exception of the body of a dead saint, Louis, formerly bishop of Toulouse. Alfonso passed about eight years in Spain, and then again turned his attention to Italy. Here the Spaniards, pressed by the queen, the pope, the dukes of Anjou and Milan, and the Genoese, had been almost overwhelmed. Alfonso arrived in 1432, and, seeing the desperate state of affairs, sailed to the island of Jerba on the coast of Africa, which he conquered, after gaining a victory over the bey of Tunis, to whom the island belonged. After this exploit he returned to Italy, where he engaged in negotiations to bring about a reconciliation with Queen Joanna, and in intrigues to obtain adherents. In 1435 the queen died, bequeathing her crown to René of Anjou, count of Provence, brother and successor of Louis III., who had died some time before; and Alfonso, thinking the occasion a favorable one for asserting his claims, renewed the war, and besieged the city of Gaeta by sea and land. But in a naval battle near the island of Ponza, he was totally defeated by the Genoese and the duke of Milan, and was taken prisoner with a great number of his followers; and shortly afterward his land forces were routed and dispersed under the walls of Gaeta. Having by his nobleness of disposition and gallant bearing gained the affection of his captor, the duke of Milan, the latter set him at liberty and became his ally, and Alfonso was thus enabled to resume his operations under better auspices. After a contest of several years without effecting much, he succeeded, by the treachery of one of the adherents of René, in making himself master of Naples in 1442, and compelled René to seek refuge in Provence. Alfonso was soon after recognized as king of Naples by the assembled states of the kingdom, and by Pope Eugenius IV., who also issued a bull legitimatizing Ferdinand, the bastard son of the king. From this time Alfonso resided in Naples, exerting himself to improve the condition of that kingdom, the affairs of which, during the reign of Joanna II. and the disturbances which followed, had fallen into much disorder; and, though taking part in some Italian wars of little importance, he passed the remainder of his life in comparative quiet. His brother John inherited the crowns of Aragon, Sardinia, and Sicily, while his son Ferdinand received that of Naples.

ALFONSO XII., of Spain. See supplement.

ALFONSO I., the first king of Portugal, son of Henry of Burgundy, count of Portugal, died in 1185. He was several times at war with the kingdom of Castile; but on the establishment of peace he turned his arms against the common enemy, the Moors, and fought a battle in 1139, on the plains of Ourique, against the Moorish king of Badajoz and his allies, which completely broke the Moslem power in Portugal. After this victory he assumed the royal title. In 1146 he took the town of Santarem after an obstinate defence, and put to the sword every living soul; and the following year Portugal was free. He instituted a code of laws, still known as the laws of Alfonso. He was succeeded by his son Sancho I.

ALFONSO V., king of Portugal, surnamed the African, born in 1432, succeeded his father Duarte in 1438, died at Cintra, Aug. 28, 1481. During his minority the regency was held first by his mother and afterward by his uncle Dom Pedro, whose daughter the young king married on coming of age. A few years later Dom Pedro was declared a rebel and killed in battle, but Alfonso soon became convinced of his loyalty, paid great honors to his memory, and punished those who had traduced him. During his reign the Portuguese discovered and colonized Guinea. In answer to the call of Pope Calixtus III. for a general crusade against the Moslems, he equipped a fleet of 250 vessels for an expedition to Africa, and in 1458 landed near Tangier with 20,000 men. It was not until 13 years later that he found himself, after severe campaigns, master of Tangier and several other cities, his conquests surpassing in importance those of any other Portuguese monarch in Africa. Having been affianced to Joanna of Castile (his wife being dead), he proclaimed himself king of Castile and Leon, but was defeated at Toro in 1476 by Ferdinand the Catholic, and driven to seek assistance in France. There Louis XI. treacherously held him prisoner till 1479, when he made peace with Ferdinand, and renounced his Spanish pretensions. Joanna took the veil in 1480, and Alfonso was about to enter a monastery when he died of the plague. He founded at Coimbra the first library in Portugal. For his zeal in ransoming Christian slaves he was called "the redeemer of captives."

ALFORD, Henry, an English author and clergyman, born in London in 1810, died Jan. 12, 1871. He was educated at Ilminster, and at Trinity college, Cambridge. In 1833 he was appointed curate of Ampton, Suffolk, and soon afterward vicar of Wymeswold, Leicestershire, where he spent 18 years. He was a fellow of his college, and from 1841 to 1857 was examiner of logic and moral philosophy in the university of London. During the years 1841 and 1842 he was also Hulsean lecturer at Cambridge. On leaving Leicestershire he became minister of Quebec street chapel (1853), where he was distinguished as an eloquent preacher. In 1857, upon the death of Dean Lyall, Lord Palmerston appointed him dean of Canterbury. He wrote poetry in the early part of his life, publishing among other volumes "The School of the Heart and other Poems" (Cambridge, 1835), of which several editions have since appeared. Didactic and defective in form, many of his poems are nevertheless regarded as gems of exquisite thought and religious feeling. Among his other works are his "Plea for the Queen's English" (1866), and "How to Study the New Testament" (1867). But he will be best remembered by his edition of the Greek Testament with English notes, references, critical commentary, &c. (5 vols., 1841–'61; new and abridged edition by B. H. Alford, 1869); and by "The New Testament for English Readers," consisting of the authorized version, with notes, marginal references, and commentary (4 vols. 8vo, revised ed., 1867).

ALFORT, a village of France, department of Seine, 5 m. S. E. of Paris, on the Marne, opposite Charenton, forming with the village of Maisons the commune of Maisons-Alfort; pop. 2,500. It is the seat of a famous national veterinary school established by Bourgelat in 1766, having courses of instruction in anatomy, botany, pharmacy, and the diseases and training of animals, a library of zoölogical works, laboratories, a pharmacy, a botanic garden, rich cabinets of specimens, a collection of living animals, and a sheepfold in which merino sheep are raised for the improvement of breeds. A certain number of scholars are admitted at the national expense. and others pay their own fees. The course of study lasts eight years.

ALFRED THE GREAT, king of the West Saxons, born at Wantage in Berkshire in 849, died probably in 901 (Oct. 26 or 28). He was the fifth and youngest son of Ethelwulf, king of the West Saxons, and seems to have been his favorite child. He was sent in his fifth year to Rome, where Leo IV. (according to the Saxon chronicles) "consecrated him king." However, the throne was first occupied by three of his brothers in succession. In the reign of Ethelred, the last of them, an unusually formidable invasion of the Danes occurred, and Ethelred was slain (871). Alfred, who had been his brother's most efficient general, was thereupon, at the age of 22, declared king by the earls and chiefs, with the consent of the whole nation. He succeeded in making a temporary peace with the invaders, which left them free to overrun the other provinces of the island. This truce lasted till 876. Alfred, meanwhile, finding it impossible to raise an army able to cope with them in the field, fitted out a naval force, with which on the commencement of hostilities he worsted them in several engagements, and in the spring of 877, according to Asser, drove 120 Danish ships on shore, causing the destruction of all on board. The next January they invaded the kingdom in greater numbers than ever. The king, with a few followers, sought safety in the woods and among the hills, and for a few months found shelter in the hut of a cowherd at Athelney, a secluded spot surrounded by marshes and accessible only by a single bridge. Here after a while he was joined by a band of fighting men, and, fortifying his position, made occasional inroads upon the possessions of the enemy. In May, 878, having been joined by an armed body of his subjects, he attacked the main army of Danes at Eddington, and routed them with great slaughter. It was on the day before this battle that he is said to have entered the enemy's camp disguised as a harper. The defeated king Godrun or Guthrun and his followers were made to embrace Christianity, and received the modern counties of Norfolk, Suffolk, and Cambridge as a place of residence. They became the subjects of Alfred, who in the course of six years seems to have made himself the virtual ruler of all England, though never formally recognized as such. His conduct before his misfortunes seems to have been haughty and selfish; but after his restoration his rule was wise and beneficent. The few years of tranquillity from 886 to 893 were employed by him in restoring the cities and fortresses which had been destroyed during the war, improving the navy, of which he is esteemed the founder, systematizing the laws, and in literary labors. The last invasion of the Northmen in his reign took place in 894, under a leader named Hastings, and after a struggle which lasted three years, of which every part of the country was in turn the theatre, they were once more driven out. He established an elaborate system of coast defences, erecting some 50 fortresses at various points, and regulated the military service so as to keep only one half the population capable of bearing arms in the field at a time, leaving the remainder to cultivate the soil. It is probable that the code of laws which bears his name is chiefly compiled from the enactments of his predecessors. He made great improvements in the administration of justice, caused the rights of property to be respected, and made great efforts for the advancement of literature and education. Although he is said to have been 12 years of age before he was taught the alphabet, he afterward became possessed of extraordinary learning. He invited literary men to his court from all parts of Europe, and although the prevailing tradition that he founded the university of Oxford is doubtful, he certainly did much for the improvement of the monastic school which had previously existed in that place. He made numerous translations from the Latin of works which he considered adapted to the wants of his countrymen, among which are the *Liber Pastoralis Curæ* of Pope Gregory the Great, Boëthius's *De Consolatione Philosophiæ*, and Bede's "History of England." He married Elswith, the daughter of a Mercian nobleman, by whom he is said to have had four sons. His disposition was gentle and amiable, and his bearing frank and affable toward all. He was merciful and forgiving toward his enemies. His health was never good; in his youth he suffered from piles; and at the age of 20 he was attacked by an undetermined internal disease causing terrible pangs, which he bore with stoical serenity, never suffering his labors to be interrupted.

ALGÆ, a large family of cellular flowerless plants, in which there is a complete series of forms, from plants of merely one or two cells to most complicated and extensive growths, as seen in many seaweeds. Algæ live for the most part entirely in water, fresh, salt, or brackish, and take their food by their whole surface from the medium in which they grow.

Laurencia pinnatifida.

Laminaria digitata.

A convenient classification divides them into five orders, *diatomaceæ*, *confervaceæ*, *fucaceæ*, *ceramiaceæ*, and *characeæ*.—The diatoms are microscopic bodies, having a spontaneous movement through the water in which they live, and silicious skeletons or frames, often of wonderful beauty, which accumulate in vast deposits at the bottom of ponds. (See DIATOMACEÆ.)—The confervas are plants of simple cells or series of cells, commonly found in fresh water, but also in salt, growing with great rapidity, and forming a green, red, or violet scum on water, or stain on snow or moist stones. The red snow (*protococcus nivalis*) consists of a single cell, which subdivides into other cells forming new individuals, so that in a few hours a large extent of snow may be covered by this plant, which is only visible by its conglomeration. A similar plant often colors many square miles of the sea, and, according to some, has given the Red sea its name. Many fresh-water confervas appear in early spring, and when examined by the microscope are shown to be delicate threads composed of a single line of transparent cells of varied shapes, containing several forms of greenish nuclei; these are the reproductive particles which are to form the spores. The star jelly (nostoc) springs up suddenly after a rain as a greenish trembling jelly. Lavers (*porphyra* and *ulva*) are stewed and eaten in Europe, and the *ulva compressa* by the Hawaiian Islanders. Several confervas have been found growing in hot springs of an elevated temperature; as at the geysers in California, in a spring of a temperature of 120° F. (W. T. Brigham).—The *fucaceæ* or seaweeds, when found in fresh water, much resemble confervas, but are distinguished from all other algæ by the position of the spores in cells or receptacles sunk in the substance of the plant and opening at the surface by a small pore. The sea aprons (*laminaria*) have broad flattened fronds attached to a cylindrical stem, which holds the plant during growth fastened to rocky bottoms; when torn off by waves, they are found floating, and sometimes of a length of several hundred feet. The *laminaria saccharina* is eaten in Japan, and the *laminaria digitata* (called "tangle") in Scotland. Bory de St. Vincent describes an alga of this family which attains a length of 25 or 30 feet, and the trunk is often as thick as a man's thigh. The *sargassum* or gulf weed forms immense beds in the Atlantic, covering 40,000 square miles. The bladder-weed (*fucus vesiculosus*) is common on rocky coasts in temperate regions, and is easily recognized by its olive-green, strap-shaped, branching divisions, bearing at small intervals air bladders by means of which its free end floats in the rising tide. This fucus is used for manure, and also for the manufacture of kelp, and, with other algæ, as a source of iodine. A nutritious gelatine is secreted by many of the fuci, and they are eaten by swine or other animals in times of scarcity, and even by man. Perhaps the most remarkable fucus is the *hydrogastrum*, described by Endlicher as a branching plant, imitating the root, stem, bud, and fruit of the higher plants, but all composed of a single branching cell.—The fourth order, or *ceramiaceæ* (rose tangles), comprises seaweeds of a rose or purplish color, seldom olive or violet; the spores are grouped in fours or threes. The order is distinguished also for the amount of gelatine many of its species contain, rendering them most useful among seaweeds. Carrageen moss (*chondrus crispus*) is used in place of Iceland moss (a lichen, *cetraria Islandica*), and its bitter flavor is partly removed by steeping in fresh water for some time before boiling; it then takes the place of isinglass in preparing jellies and blanc-mange. Dulse (*iridæa edulis*) is a thin purplish seaweed, which is eaten, as well as another alga, *rhodomenia palmata*, by the Scotch and Irish, who call it dillesk, and the Icelanders, who name it sugar seaweed; within a few years it has become an article of food among the foreign population of Boston, and is sold in the streets. The East Indian swallows are said to construct the edible birds' nests from the *gelidium*, a genus of this order. The *plocaria tenax* (*glæopeltis*) furnishes so much good gelatine that it is an important article of commerce among the Chinese, many tons being annually imported at Canton for the preparation of glue and varnish for lanterns, windows, and paper umbrellas,

Chondrus crispus.

Fucus vesiculosus.

also to give a gloss to silks and to size paper; windows are frequently made of strips of bamboo coated with this glue. As objects of beauty this order affords many fine species, as the *laurencia pinnatifida*, shown in the first cut.—The *characeæ* are aquatic plants of a more obscure organization than any of the previous orders; they usually exhale a fetid odor, supposed to be unwholesome, and are curious as exhibiting under the microscope a circulation in their transparent stems and branches.—*Reproduction of the algæ.* There are four principal ways in which algæ may produce new individuals. 1. A direct action is exercised by formations playing the part of male organs upon a minute mass of protoplasm, which before this action has no coating of cellulose, but now acquires this and becomes a spore. This male organ is analogous to the anther of flowering plants, and is hence called antheridium; but while the anther produces pollen, the antheridium gives birth to little bodies of a very different nature, which have the power of locomotion by means of vibratile ciliæ and closely resemble animalcules; these are called antherozoids. An example of this method is seen in *vaucheria*, an alga consisting of green, one-celled filaments, common in ditches. The antheridium develops from the side of one of these filaments as a horn-like projection, and is soon followed by a similar excrescence in its immediate neighborhood called the sporangium; these are at first continuous with the tube on which they grow, but finally form a partition completely separating their contents from the parent plant. The antheridium then opens, discharging the antherozoids, which move at once toward the opening end of the sporangium, and are met by a layer of mucilage, into which they thrust themselves and then retire, repeating this curious action for half an hour, until a thin membrane appears across the opening, due doubtless to the penetration of an antherozoid; and then the others move more and more slowly, and at last become quite still. The fecundated sporangium when grown detaches itself from the plant as a cell filled with brownish particles. After three months it recovers its green color and elongates into a tubular filament of the perfect alga. 2. The same *vaucheria* often shows the extremity of its filament swollen into a club shape, and the green matter is condensed there until it assumes a blackish tint and becomes enclosed in its own membrane. The end of the filament bursts and permits the escape of a zoöspore, which is covered with vibratile cilia having so rapid a motion that to make them visible it is necessary to retard the motion by opium, or arrest it entirely by a very weak solution of iodine. The zoöspores, produced apparently without the intervention of sexes, move through the water for some time, and when the cilia cease to vibrate soon germinate. 3. The ordinary fucus presents in its substance cavities or conceptacles opening when mature by small pores, through which escape, in the female plants, the sporangia, which contain eight spores in a membrane which soon dissolves, setting free in the water the spores, and in the male plants the antheridia, which also burst and discharge antherozoids, which are small bodies with two long cilia. The antherozoids meet the spores, which seem simply mucilaginous globules, and attaching themselves impart to the spores a rapid rotary motion, lasting usually six or eight minutes. The spore immediately becomes covered with a membrane, and is ready to germinate as a new fucus. 4. Reproduction by conjugation is seen in the fresh-water alga *spirogyra*, which is common in stagnant water in the early spring. The slender filaments of which it is composed are divided into cells by transverse partitions, and these cells contain gelatinous endochrome. Two adjacent filaments conjugate on contact, two cells swelling toward each other and finally uniting, when the contents of one are transferred to the other, and the communication is closed and the full cell develops a spore. The spores are formed sometimes in one filament, sometimes in the other, and when mature break away the cells and elongate into new spirogyras. This process may be seen with a microscope of low power, and so short is the time occupied that it may be easily followed from beginning to end.—Like higher plants, algæ absorb carbonic acid and exhale oxygen in sunlight, although they are not so dependent on the sun for their bright colors, these existing at depths where the light would be less than half a candle. Professor Harvey has adopted a classification from the color of the spores, which is often used as exceedingly convenient, into chlorosperms, with green spores and usually with a greenish color over all the plant; rhodosperms, with rose-colored spores; melanospores, with olive-brown spores. From the motive powers of the zoöspores of algæ, it is not strange that the early microscopists should have confounded the animal and vegetable kingdoms, which come so close together in the spores of algæ and the lowest of animals.

ALGARDI, Alessandro, an Italian sculptor, born in Bologna about the year 1600, died in 1654. Domenichino obtained employment for him at Rome. By a statue of St. Philip Neri in the sacristy of the Oratorian church in that city, and a colossal group representing the decapitation of St. Paul in the church of the Barnabites at Bologna, he achieved a reputation as the first sculptor of his time. He was chosen to execute the bronze statue of Innocent X., erected to commemorate the completion of the capitol at Rome. He produced the monument of Leo XI. in St. Peter's; and for one of the altars in the same church he made the largest basso-rilievo in the world—a work in marble representing Attila checked by St. Leo.

ALGAROTTI, Francesco, an Italian scholar, born in Venice, Dec. 11, 1712, died in Leghorn, March 3, 1764. After studying in Rome and Bologna, he visited France and England, and in Paris wrote "Newtonianism for Ladies" (*Neutonianismo per le dame*, 1734). He then went to Russia with Lord Baltimore, and published an account of the country, and in Germany became acquainted with Frederick, then crown prince of Prussia, one of whose first acts on coming to the throne was to invite Algarotti to his court. Henceforth the Italian lived in close intercourse with the king. He was created a count, appointed chamberlain, employed occasionally in diplomatic affairs, and commissioned by the elector of Saxony to collect works of art for the Dresden gallery.

ALGAROVILLA, an astringent substance, produced by the tree *juga Marthæ*, an acacia, found at Santa Marta in New Granada. The portions taken to England, and examined by Dr. Ure, were pods bruised and agglutinated with the extractive exudation of the seeds and husks. It is replete with tannin, and for tanning leather possesses more than four times the strength of good oak bark. It is also well adapted for the manufacture of black ink, for a yellow dye, and for an astringent medicine.

ALGARVE, the southernmost province of Portugal, bounded by Alemtejo, Spain, and the Atlantic; area, 1,872 sq. m.; pop. in 1868, 177,342. It is watered by several small rivers and by the Guadiana, which divides it from Spain. A considerable mountain range in the north forms a watershed between it and Alemtejo. The S. W. part of the province is mountainous and rocky, and of wild and dreary aspect. The plains and valleys produce fruits in abundance, among them dates, figs, almonds, and oranges, which, with wines and fish, form the chief exports. The principal towns are Faro, the capital, Tavira, and Lagos, all on the S. coast, which ends in Cape St. Vincent, the S. W. extremity of Europe.—Algarve originally extended over much of S. Spain, and also included a portion of N. W. Africa, where the name is still retained by a province of Morocco (*El Gharbie*, the western land). It constituted a Moorish kingdom till the 13th century, when it was gradually conquered, and the part W. of the Guadiana finally annexed to Portugal as Algarve d'aquem Mar (this side the sea) in 1253. The African portion was conquered by Alfonso V. and formed into the province of Algarve d'alem Mar (beyond the sea) in 1471; and his successors are still called kings of Portugal and the Algarves.

ALGAZZALI, Abu Hamed Mohammed, a Moslem philosopher, born at Tus, Persia, about 1058, died in 1111. His father was a dealer in cotton thread (*gazzal*, whence the name Algazzali), and on his death the son was intrusted to the care of a sufi, or mystical philosopher. He became a professor of theology at Bagdad, and attracted hundreds to his lectures. Anxious to attain to the purest state of which man is capable, he found that for this purpose the soul must be purified from all connection with earth. Accordingly he distributed his wealth, and sought in Syria, in solitary communion with himself, to attain that ecstatic state for which he longed. He spent some time in this manner, and in travelling, settling at last at Nishapoor, and there he passed the remainder of his days, sometimes, as he says, experiencing the highest bliss of the ecstatic state, but only occasionally, and for a short time. He was a very prolific writer, but his works were not all considered entirely orthodox by the Mohammedans, and one of them was condemned to be burned on account of some strictures on the Mohammedan law. One of his works attained so high a reputation among the Moslems, that they sometimes said, if all Islam were destroyed, it would be but a slight loss provided Algazzali's work on the "Revivification of the Sciences of Religion" were preserved. (See Lewes's "Biographical History of Philosophy.")

ALGEBRA (Arab. *al-jaber*, the science of solution), originally, a kind of higher arithmetic in which the numbers are replaced by symbols; but by later applications the symbols are used as well for geometrical quantities in space, or in mechanics for velocities, distances, and times, so that at present algebra occupies itself with quantities in general, whatever be their nature. The oldest work on this science is that of Diophantus of Alexandria, a Greek writer, who possibly flourished as early as the 4th century, of which the six books that have come down to us do not contain the elements, but the theory of the evolution of powers, and the method of solving undetermined problems. Many problems of this kind were by the ancients considered determined, as they threw out all solutions in irrational quantities. The Brahmins of Hindostan also had a knowledge of algebra, as well as the Arabs; but to whom belongs the priority of the invention it is at present impossible to determine. It is only known that this science was introduced into Christian Europe by the Moors of Spain, a little before the year 1100. For the first three centuries after its introduction it was chiefly studied in Italy, and Lucas Paciolus de Burgo (Luca di Borgo) was the first European writer on the subject. His principal work, *Summa Arithmetica et Geometrica*, was published in Venice in 1494, and republished in 1523. He mentions a Pisan merchant, Leonardo Bonaccio, who lived in the beginning of the 13th century, and learned algebra in travelling among the Arabs along the coast of Africa and in the Levant. Some historians give to him the honor of having introduced this science in Europe, while others, among them Montucla, the great historian of mathematics, mention Paolo de l'Abacco and Belmondo of Padua, who preceded Bonaccio. From the works of Luca di Borgo it appears that in 1500 the science did not go beyond equations of the second degree, the negative solutions were rejected, and the symbols consisted chiefly of abbreviations of words. Great advance was made by Jerome Cardan, who in 1545 published his *Ars Magna*, in which he gave the solution of equations of the third degree, by an operation which is still known among all mathematicians as the formula of Cardan; those of the fourth degree were solved by his pupil Ludovico Ferrari, and published in the *Ars Magna*, in which also he makes the distinction between positive, negative, and irrational solutions. At the same time Stifelius in Germany invented the signs +, —, and √, which did so much to simplify the formulas; he published his *Arithmetica Integra* in Nuremberg in 1544. In 1552 Robert Recorde published in England "The Whetstone of Witte," in which for the first time the sign of equality (=) is introduced. From that time not much progress was made till Vieta in France perfected the algebraic operations and transformations of formulas, and even advanced so far as the general solution of equations of all degrees. He first applied algebra to geometry, and he also found the remarkable expression which solved numerically the problem of the quadrature of the circle. His works were written about the year 1600, but only published long after his death, by Schooten. Among the eminent mathematicians of that time we must also mention Gerard in Flanders, who was the first to indicate the important use of the negative roots of equations in geometrical constructions, while in England Harriot introduced the signs > and <, and Oughtred first wrote the decimal fractions simply by the decimal point, as we do now, without writing the denominator always, as was customary till his time. The 17th century was the most brilliant of all centuries in mathematical discoveries, producing the immortal Descartes, Fermat, Wallis, Galileo, Huyghens, Kepler, Newton, Leibnitz, Bernoulli, and many others not less illustrious; and that century closed with the important discovery of the logarithms and of the differential calculus. The 18th century enriched the vast domain transmitted, and men like Laplace, La Grange, D'Alembert, Maupertuis, Maclaurin, Waring, Lambert, Cutler, Stirling, De Moivre, and above all Euler, developed and perfected all the branches of the science. —The operations of algebra are founded on a mutual agreement concerning signs and symbols. The first letters of the alphabet, a, b, c, &c., are used to represent known quantities, whether of space, time, or number, and the last, z, y, x, &c., are used for the unknown quantities. They are connected by the signs +, —, ×, and ÷, meaning respectively addition, subtraction, multiplication, and division. The powers of quantities are expressed by superior numbers, as a^2 for $a \times a$, a^5 for $a \times a \times a \times a \times a$; the roots by the sign √, or $\sqrt[3]{}$ and $\sqrt[5]{}$, &c. The small space in which a long operation can be indicated by these signs may be illustrated by the following algebraic expression:

$$\frac{17a \times (c-d)^2 + c^3 \times \sqrt{(a^2-b^2)} - a \times c}{\sqrt{(b \times c)} - (a-b) \times (c-d) + acd} + \frac{\sqrt{3ab}}{8a^5}$$

which is an ordinary expression involving so many operations that to describe them clearly would occupy a whole page.

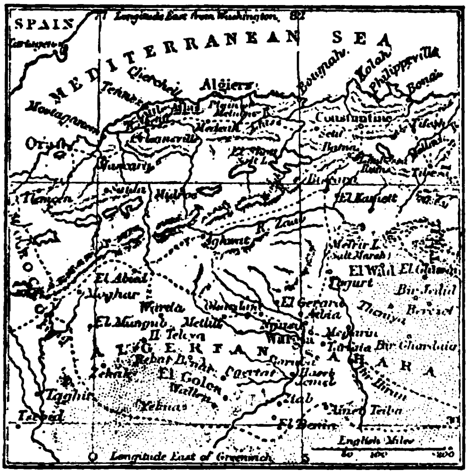
ALGECIRAS, a seaport and town of Spain, in Andalusia, province of Cadiz, on the W. side of Gibraltar bay, opposite and 6 m. W. of Gibraltar; pop. 18,000. Charles III. rebuilt it in 1760, as a point of annoyance against Gibraltar. It is constructed of stone, and presents a fair appearance compared with many of the smaller Spanish towns. The port is guarded by a battery called the Fuerte de Santiago. The town is supplied with water conveyed by an aqueduct over the Miel. The principal trade is the export of coal from the neighboring mountains, charcoal, and leather. Two considerable sea fights took place off Algeciras in July, 1801, between the English and French squadrons, and in the second the English were victorious.

ALGERBA, the third star in the constellation of Leo. It is a noted star among astronomers, being used as a test for telescopes, which prove it to be double. One of its constituents is orange, the other green.

ALGER, Horatio, Jr., an American author, born at Revere, near Boston, Mass., Jan. 13, 1834. He graduated at Harvard college in 1852, and was afterward engaged partly in teaching and partly in writing, being for a time editorially connected with two Boston newspapers. He then spent a year in travel in Europe, corresponding with American papers. Upon his return he resumed teaching and writing. In 1866 he took up his residence in New York, where he became deeply interested in the condition of the street boys. This has given form to most of his later writings. Prominent among these are the "Ragged Dick" series and the "Tattered Tom" series. With the exception of "Helen Ford, a Novel," and various magazine papers, Mr. Alger's writings belong mainly to the class of books for the young.

ALGER, William Rounseville, an American clergyman and author, cousin of the preceding, born at Freetown, Mass., in 1823. He graduated at Harvard college in 1847, studied for the ministry, and became pastor of a Unitarian church in Roxbury. In 1855 he removed to Boston, where he succeeded Theodore Parker as minister of the "Liberal Christians" who worship in Music Hall, Boston, where he still continues to preach (1873). His works comprise "The Poetry of the Orient, or Metrical Specimens of the Thought, Sentiment, and Fancy of the East" (1856); "A Critical History of the Doctrine of a Future Life" (1861); "The Genius of Solitude, or the Loneliness of Human Life" (1867); and "Friendships of Women" (1870).

ALGERIA, a division of N. Africa, formerly the Turkish pashalic of Algiers, but since 1831 included in the foreign dominions of France, bounded N. by the Mediterranean, E. by Tunis, W. by Morocco, S. by the Great Sahara. It is, in the main, situated between lat. 32° and 37° N., and lon. 2° W. and 9° E. The boundaries are not well defined, as large portions of the border districts are claimed both by the French government and the nomadic tribes which inhabit them. An official statement in 1850 estimated the area at 150,568 sq. m., distributed as follows among the three provinces: Algiers, 43,627 sq. m.; Oran, 39,375; Constantine, 67,566. Later unofficial calculations make it as high as 258,317 sq. m. (Algiers, 39,120; Oran, 111,831; Constantine, 107,366). The Atlas mountains constitute an important physical feature in the country. The Little Atlas runs along the rocky coast, and varies from 3,000 to near 7,000 ft. in height; while in the south the Greater Atlas reaches, or even exceeds, in some points an elevation of 8,000 ft. Between the Little and the Greater Atlas extends a plateau called the Tell (highlands), varying in height from 1,900 to 3,600 ft., and containing a large number of salt lakes, which dry up during the summer months. Long, winding defiles lead S. from the Greater Atlas into the Algerian Sahara. This desert, occupying more than half the country, contains many fertile oases and the large salt lake of Melrir, which receives a number of small rivers. The number of oases has been increased by means of artesian wells dug by order of the French government. The principal plain of the country, that of Metidjah, belongs to the region of the Little Atlas. The Greater Atlas forms the watershed of the country. The principal river is the Shelliff, which has a tortuous course of about 200 m. and flows into the Mediterranean. The rivers which flow from the S. side of the Greater Atlas lose themselves in the desert, and none are navigable. They are nearly dried up in the summer, but overflow a considerable extent of country in the spring and fertilize the soil.—The climate is generally warm, but the heat is rarely oppressive except under the prevalence of the simoom or hot wind from the Sahara, when the temperature ranges as high as 110°. A large portion of the country is healthy, even for Europeans; but in the marshy districts the foreign-born population generally succumb to fevers. Ophthalmia and cutaneous diseases are common. On the limits of the desert the soil is arid and sandy, but between the mountain districts it is fertile, and especially so in the neighborhood of the streams. Grain crops of all kinds, European and tropical fruits, flowers, and particularly roses, of remarkable beauty, and a species of sugar cane, said to be the largest and most productive of any known species, grow in Algeria. Domestic animals of every variety are numerous. The horses are excellent; the asses are of fine growth and much used for riding. The camel and dromedary of Algeria are very superior. The merino sheep is indigenous. The Numidian lion, the panther and leopard, ostriches, serpents, scorpions, and many venomous reptiles are abundant.—The chief towns are Algiers, the capital (pop. in 1866, 52,614), Constantine (35,417), and Oran (34,058). Near Bona, on the northeastern coast, are the coral fisheries, frequented by the fishers from France and Italy. Bougiah is on the gulf of the same name. On the coast, between Algiers and Oran, are Koléah, Cherchell (the ancient Cæsarea, the residence of Juba), and Mostaganem. Tlemcen, once the residence of Abd-el-Kader, is situated in a fertile country, near the Moroccan border; the ancient city was destroyed by fire in 1670, and the modern town was almost destroyed by the French. Other towns of the interior are Blidah, Médéah, and Milianah, S. and S. W. of the capital. South of the Greater Atlas is the Zaab, the ancient Gætulia. The chief place is Biscara; the Biscareens are a peaceful race, much liked in the northern ports as servants and porters. There are many remains of antiquity in the interior, especially in the province of Constantine, among others those of the ancient city of Lambessa, with remains of the city gates, part of an amphitheatre, and a mausoleum supported by Corinthian pillars.—The total population in 1866 was 2,921,246, of whom 217,990 were of European descent. Among the latter there were 122,119 Frenchmen, 58,510 Spaniards, 16,655 Italians, 10,627 Maltese, 5,436 Germans, and 4,648 of other nationalities; 72,508 were born in Algeria. In 1831 the European population was 3,228; in 1836, 14,560; in 1841, 35,727; in 1846, 99,801; in 1851, 131,283; in 1856, 159,232; in 1861, 192,746. The number of Mohammedans living in the territory subject to civil government in 1870 was 225,693; nomads, 2,434,974; native Jews, 33,117. A comparison of the above figures with former censuses shows a decrease of the native population, while the Europeans slowly increase. The great efforts made by the government to promote colonization induced from 1830 to 1855 about one million Europeans to emigrate to Algeria; but the majority either returned after a short time or succumbed to the climate. From 1830 to



1851 the number of deaths (60,678) exceeded the births (44,900) by 16,000. Among the children of the Europeans the mortality is even greater than among the adults. The Moorish population in the cities is likewise decreasing; only the Jews show a steady increase. The general result of the efforts for colonization is trifling. From 1831 to 1866 the government had ceded to European settlers no more than 222,269 hectares. For several years the number of Europeans leaving the country was almost as large as the number of new arrivals. Thus in 1856, 30,460 returned to Europe, and only 39,239 arrived. The republican government hoped for an improvement of this state of affairs from a limitation of the military and an enlargement of the civil authority of the country; and in order to induce the malcontent inhabitants of the districts ceded in 1871 to Germany to emigrate to Algeria, it placed by a decree of June 21, 1871, 100,000 hectares of the best government lands at their disposal. The Berbers or Kabyles, who call themselves Mazidh (noble), are believed to have been the aboriginal inhabitants, the Numidians and Gætulians of antiquity. Arabs, the descendants of the Mussulman invaders, Moors, Turks, Kulughs, Jews, and negroes, and lastly the French and other European Christians, form the rest of the population. The Kabyles are an industrious race, living in regular villages, excellent cultivators, and working in mines, in metals, and in coarse woollen and cotton factories. They make gunpowder and soap, gather honey and wax, and supply the towns with poultry, fruit, and other provisions. The Arabs follow a nomadic life, shifting their camps from place to place. The Moors are probably the least respectable of the inhabitants. Living in the towns, and more luxurious than either the Arabs or Kabyles, they are, from the constant oppression of their Turkish rulers, a timid race, reserving nevertheless their cruelty and vindictiveness, while in moral character they stand very low. The nomads live in tents; other tribes inhabit dwellings of somewhat greater stability called *gourbis;* only a few have houses. The proportion of the three classes in 1857 is shown by the following table:

PROVINCES.	Mountain Kabyles.	Kabyles of the Plain.	Arabs.	Tents.	Gourbis.	Houses.
Algiers.....	280,474	27,800	447,752	55,529	65,837	39,381
Oran.......	22,819	45,462	431,485	77,389	6,986	8,772
Constantine.	277,135	305,691	506,195	111,181	63,405	31,327
Total....	580,428	378,953	1,385,432	244,099	136,228	79,480

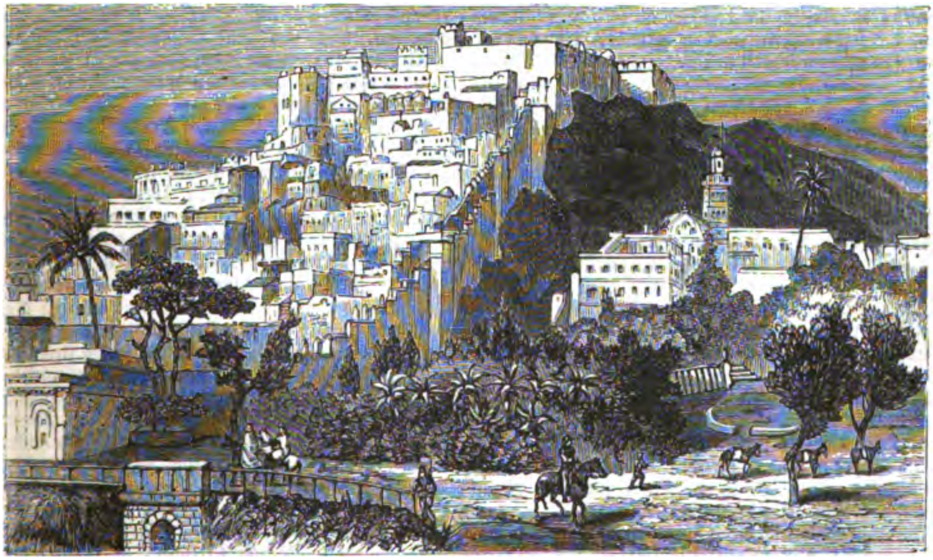
—The census of 1866 returned 211,195 Catholics, 5,002 Protestants, 33,952 native Jews, 1,785 European Jews, 17,232 members of other Christian sects or persons of unknown religion, and 2,652,072 Mohammedans. For the Catholics a bishopric was erected at Algiers in 1838, which in 1867 was raised to an archbishopric; in the same year the new dioceses of Oran and Constantine were created. For the Protestants a decree of 1857 created consistories at Algiers, Oran, and Constantine, under which both the Lutheran and the Reformed churches are placed. The religious affairs of the Mohammedan population are placed under the muftis of the two principal mosques at Algiers. The number of free public schools in 1866 was 426, with 45,375 pupils. For secondary instruction there were lyceums at Algiers, Bona, Constantine, Philippeville, and Oran, the secondary institutions at Tlemcen, and the free school of Oran. The system of public instruction for the Mohammedans comprised the *douar* schools, the law schools (*zaïouas*), the schools of law and literature (*medresas*), the French-Arabic schools, and the French-Arabic colleges. The French troops in Algeria consisted in 1866 of 67,774 men. Besides the garrison troops, which after a certain number of years return to France, there are the so-called native troops, which do not leave the colony except in time of war, and consist of three regiments of Turcos, three of zouaves, three of chasseurs d'Afrique, and three of spahis; altogether 15,000 infantry and 3,000 horse.—The administration of Algeria was in 1859 placed under a special ministry, which was abolished by decree of Dec. 11, 1860. It was then placed in the hands of a military governor general, to whom all civil as well as military authorities were subordinate. The republic, established in 1870, placed at the head of the administration a civil governor, who convokes annually for the establishment of the budget a council, consisting of the three prefects, the archbishop, the military commander, and other notables. Algeria also received the right to send six deputies to the national assembly. At the head of each of the three provinces is a prefect.—The revenue of Algeria in 1866 amounted to 42,223,000 francs, and the expenditure to 47,470,000. The French budget provides in addition for the maintenance of the army, for public works, and for many other expenditures. In the budget of ordinary and extraordinary expenditures of 1871, the expenditure for Algeria is set down at 22,691,925 francs. According to a statement made by Picard in the legislative body in 1854, Algeria at that time had cost France about three milliards of francs and the lives of 150,000 soldiers. In 1868 the government made an agreement with the *société générale algérienne* for a loan of 100,000,000 francs, which is gradually to be used for the general improvement of the country. The imports in 1868 were valued at 192,664,360 francs, and the exports at 103,069,804. The chief articles of import in that year were cotton cloth, woollens, leather and leather goods, wine, brandy, and spirits, fresh fruit, sawed timber, and materials for building. The exports included sheep, wool, tallow, hides, coral, iron, fibre, reeds, cork, olive oil, tobacco, fruit, vegetables, rags, and cotton. In 1870 the most important article of export was esparto for making paper. The movement of shipping in 1867 was as follows:

FLAG.	ENTERED.		CLEARED.	
	Vessels.	Tons.	Vessels.	Tons.
French	527	121,010	659	131,331
Foreign	1,714	164,285	1,625	149,192
Total	2,241	285,295	2,284	280,523

The merchant navy of Algeria, on Dec. 31, 1868, consisted of 147 sailing vessels, of 4,098 tons. A decree of July 11, 1860, gave to a company, at the head of which were Count Branicky and the banker Gautier, a charter of 99 years for the construction of a number of important railroad lines; but in 1870 only one of them, that from Constantine to the sea, was near its completion. The telegraphic connection of Algeria with France was established in July, 1870, by a submarine cable between Bona and Marseilles.—The earliest inhabitants of Algeria of whom we have any trustworthy accounts were the Numidians and the Moors (Mauri). The former lived in the mountain districts of the east, and the Moors in the west, where they established many flourishing coast towns, which carried on a brisk trade with Europe. The conquest of Carthage in 146 B. C. laid the foundation of the rule of the Romans in this part of Africa, which was gradually extended over the whole of the present Algeria. The eastern district at first constituted a portion of the province of Africa, but from the time of Constantine the Great it formed the province of Numidia, and the western district became the province of Mauritania Cæsariensis. The whole country attained a high degree of prosperity. As a defence against the savage mountain tribes the Romans built several forts, one of which, Guelma, is still extant. In the early part of the 5th century the country was conquered by the Vandals, in whose possession it remained till 534, when Belisarius subjected it to the Byzantine empire. The Arabs about 160 years later advanced into the mountains of the Numidians. The Christian religion, which had early been introduced into the country, was wholly extinguished by the Mohammedan conquerors; but the people partially recovered from the state of barbarism into which they had relapsed under the rule of the Vandals. After belonging for a time to the dominions of the Ommiyade caliphs, Algeria became an independent Moorish state, under the dynasty of the Zereides, which ruled it from 970 to 1148, when Roger of Sicily conquered northern Africa. A few years later (1159) the Almohades of Morocco obtained possession of Algeria and ruled there till 1269, when they were expelled by the Zianides of Fez. This dynasty became at the close of the 15th century involved in protracted conflicts with the Spaniards, especially when about 20,000 families of Moors and Jews, who in 1492 had been expelled from Spain, settled in Algeria and sought revenge in piracy. In 1506 the Spaniards took Bona, and in 1509 the capture of Oran by Cardinal Ximenes, and of the city of Algiers itself, completed the subjection of nearly the entire province. The Spaniards erected fortifications at Algiers, but shortly before the death of King Ferdinand in 1516 the emir of Metidja called to his aid the pirate Horuk Barbarossa. This chief expelled the Spaniards from Algiers, murdered the emir, and made himself ruler of the city and its territory. Soon afterward he conquered Tenez and Tlemcen. The Spaniards defeated him in 1517, and in 1518 put him to death. His brother and successor Khair-ed-Din sought assistance from the sultan Selim I., and acknowledged that prince as his sovereign. Selim appointed him pasha of Algiers, and sent him a body of troops with which he repulsed the Spaniards and made himself master of the country. Charles V. made an attempt to reinstate the Spanish authority, and a powerful expedition of 370 vessels and 30,000 men crossed the Mediterranean in 1541; but a storm and earthquake dispersed the fleet, and cut off all communication between it and the army. The troops made their escape with a loss of 8,000 men, 15 vessels of war, and 140 transports. From this time forward there were unceasing hostilities between the Barbary powers and the knights of Malta; thence sprang that system of piracy which made the Algerine corsairs so terrible in the Mediterranean. On the other hand, the boundaries of Algeria were constantly extended in the wars with the neighboring tribes. Before the close of the 16th century the pasha of Algeria had advanced westward as far as the frontier of Morocco. Oran, however, remained in the hands of the Spaniards till 1708. Bugia in the east was conquered in 1554, and in the south the territory of Algeria was extended as far as the desert. Several attempts made by the Spaniards to reconquer the western provinces utterly failed. In 1561 an entire Spanish army was annihilated at Mostaganem, the Algerines capturing 12,000 men. The duke of Beaufort in 1663 and subsequent years gained several successes, but they had no permanent results. The English under Blake (1655), the French under Duquesne (1682 and 1683), the Dutch, and other powers, at various times attacked Algiers; and Duquesne twice bombarded it. Thousands of Christian slaves constantly languished in captivity in Algiers; and societies of pious men were formed, whose express object was to ransom the prisoners. Meanwhile the authority of the Turkish government had been reduced to a name. The janizaries from 1600 elected their deys, and these finally declared their independence of the Porte. The last Turkish pasha was expelled by Dey Ibrahim in 1705; and the janizaries by tumultuous elections appointed new chiefs, whom in their mutinies they often murdered. The janizaries were recruited from the immigrants from Turkey, no native, though the son of a janizary by a woman of the country, being admitted into their ranks. The dey sent occasional presents to Constantinople as a token of his nominal allegiance; but all regular tribute was withdrawn, and the Turks, hampered by their constant struggles with Russia, were too weak to chastise the rebels of a distant province. In 1775 Spain undertook her last great expedition against Algiers. The fleet consisted of 44 war vessels and 340 transports under Admiral Castejon, and the army, which was under the command of Gen. O'Reilly, of 25,000 men. Like all the former expeditions, it was utterly unsuccessful. The weaker Christian powers, like Naples, Denmark, Sweden, and the Hanse towns, submitted to the annual payment of a tribute, which nevertheless did not always protect their vessels. England remained inactive because the insecurity of the Mediterranean injured the commerce of other powers more than her own. During the French revolution and the empire, the presence of large fleets in the Mediterranean put a check to the piracies. On the renewal of peace, however, the Algerines recommenced their depredations; but now the Americans, who in 1795 had been compelled to follow the example of European nations, and to subsidize the dey for peace, refused the tribute. In June, 1815, Commodore Decatur encountered an Algerine squadron near Cartagena, took a frigate and a brig, and sailed into the bay of Algiers, where he forced the dey to surrender all American prisoners, and to abandon all future claims for tribute. This bold example was followed by the English, who, under Lord Exmouth, bombarded the city in 1816, and reduced it to ashes, compelling the dey to surrender his prisoners. Piracy, however, was not suppressed, and in 1826 the Algerines openly seized Italian vessels in the Mediterranean, and even carried their incursions into the North sea. Meanwhile a serious quarrel had broken out with France. In 1823 the dwelling of the French consul had been plundered; the Algerine ruler, Hussein Bey, personally insulted the consul and spoke disrespectfully of the French king; and various outrages were committed on French vessels. Algiers was blockaded, and negotiations were opened between France, Mehemet Ali, and the Porte, by which Mehemet Ali, with the assistance of France, undertook to conquer Algiers, and to pay a regular tribute to the sultan. This was broken off, and the government of Charles X. at last sent an expedition against Algiers in June, 1830, consisting of 38,000 men and 4,000 horses, under command of Gen. Bourmont. Algiers capitulated July 4, on condition that private property and the religion of the country should be respected, and that the dey and his Turks should retire. The French took 17 ships of war, 1,500 bronze cannon, and nearly $10,000,000 in specie. They immediately garrisoned Algiers, and established a military regency. Small squadrons sailed to Tunis and Tripoli, and concluded treaties with these states, which put an end to piracy. Gen. Bourmont was made a marshal, and within a short time captured Bona, Oran, and Bugia. The French intended to surrender Algiers to the sultan, and instructions to that effect were actually on their way to Constantinople when Charles X. was dethroned, and Louis Philippe decided to retain the conquest. Clausel was sent over as general-in-chief in place of Bourmont. As the Turkish soldiers, who had thus far ruled Algeria, were driven out of the country, the Arab and Kabyle tribes soon rose against the new rulers. Each town had to be captured in detail at an immense sacrifice of life. The Marabouts preached a holy war against the Christian conquerors, and the insurgents found an able chief in the young emir Abd-el-Kader. Clausel was replaced by Berthezène, and the latter by Lieut. Gen. Savary, duke of Rovigo, in the course of 1831. In carrying on the war against the natives Savary committed the most treacherous acts. The whole Arab tribe El-Uffia, including the old men, women, and children, were massacred in one night on account of a robbery committed by some members of the tribe. In consequence of such cruelties the entire nation again flew to arms, under the lead of Abd-el-Kader, who maintained the struggle through the reign of Louis Philippe. (See **Abd-el-Kader**.) In December, 1847, he surrendered to Gen. Lamoricière. The war against Abd-el-Kader thus closed had been signalized on the part of the French by many cruelties, none of which produced so painful a sensation as an act of Col. Pélissier, in 1845, in smothering several hundred Arabs in a cavern. The next notable insurrection was that of the fanatical Marabout Si-Bou-Zian, who in 1849 raised a rebellion among the mountain tribes, but was finally pursued by the French to the oasis of Zaatsha, where he perished (Nov. 26), with the entire population of his last stronghold. Gen. St. Arnaud in 1851, and Marshal Randon in 1857, fought with success against the Kabyles.—The administration of Algeria underwent a considerable change by the imperial decrees of 1858, which abolished the office of governor general, and appointed Prince Napoleon chief of a special ministry for Algerian affairs. The civil districts were more strictly separated from the military territory, and general councils introduced. But after a trial of only two years, the government was regarded as a failure; the Algerian ministry was abolished, and Marshal Pélissier reappointed to the office of governor general, which he had previously filled for a few months in 1851. One of the greatest benefits which the French rule has conferred upon both colonists and natives is the successful boring of a number of artesian wells in the desert, the first of which was begun in 1856. In February, 1863, Napoleon III., in a letter to the governor general, expressed the opinion that Algeria properly was not a French colony, but an Arabic kingdom; that it was wrong to take from the natives any part of their property; that, on the contrary, the tribes and parts of tribes should be made the owners of the territory they occupied, and that a careful legislation should regulate the conditions of personal property. Though this letter appeared to make some impression upon the minds of the natives, the year 1864 witnessed a new insurrection in the south of Algeria, which was headed by Si-Lala; but at the close of the year the country, of which Gen. MacMahon after the death of Pélissier had been appointed governor general, was again fully pacified. In May, 1865, Napoleon paid a visit to Algeria, and there addressed a proclamation to the population, in which he repeated the sentiments expressed in the letter to Pélissier. From October, 1865, to the beginning of 1867, the French were again harassed by new insurrections under the leadership of Si-Lala and Si-Hamed ben Hamza, who in 1861 had been made a commander of the legion of honor. Si-Hamed, at the head of about 12,000 cavalry, committed great depredations among the tribes friendly to the French rule; but at the beginning of 1867 all the insurgents had either been driven into the Sahara or annihilated. From 1869 to 1870 the colony suffered from famine, locusts, and earthquakes, but was almost free from warfare. After the outbreak of the Franco-German war, the French government in July, 1870, called Governor General MacMahon, and with him the larger portion of the native troops, to the seat of war in France. The news of the disaster at Sedan caused insurrectionary movements in the province of Constantine in September, 1870, and in October in Oran, where the insurgents were joined by some Moroccan tribes; but Gen. Durieu, the successor of MacMahon, succeeded in preventing the troubles from spreading. At the same time the European colonists asked for the abolition of the military administration; and a civil governor was appointed, under whom three prefects administer the three provinces. Algeria also obtained representation in the national assembly which in February, 1871, met in Bordeaux.—See MacCarthy, *Algeria Romana* (Algiers, 1867); Daumas, *Le Sahara Algérien* (Paris, 1845), *Le grand désert* (2d ed., 1849), and *La Grande Kabylie* (1847); Yusuf (a chief of the Turkish troops in Algeria who joined the French as early as 1832, and subsequently rose to the rank of a general), *Sur les guerres en Afrique* (Algiers); Nettement, *Histoire de la conquête d'Alger, écrite sur les documents inédits et authentiques* (2d ed., 1871).

ALGHERO, or Algheri, a strongly fortified seaport town on the N. W. coast of Sardinia, in the province and 11 m. S. W. of Sassari; pop. 8,000. It was a favorite residence of Charles V. The coral found here is the finest obtained in the Mediterranean.

ALGIERS (Arab. *Al-Jezireh*, the island, because there was originally an island before the city, which has been joined by a mole), a seaport and city of N. Africa, in lat. 36° 47′ N., lon. 3° 4′ E. It was formerly the capital of a pashalic of the same name, and dependent on the Ottoman empire, but since 1830 has been the capital of the French colony of Algeria. The population, which under the Turks was estimated at 100,000, has since been subject to great fluctuations. In 1838 it was 30,395; in 1846, 70,582; in 1851, 50,111; in 1862, 58,315; in 1866, 52,614; and at present it is estimated at 60,000. Of these, 16,000 are French and 6,000 Jews. The Jews have since the occupation of the country by the French become the most prosperous part of the population, owning most of the land in the city. The natives



Algiers from the Parade Ground.

manufacture arms, leather, silk stuffs, jewels, &c. The town is built in the form of an amphitheatre, on the N. slope of Mount Boujarin, which rises 500 feet above the bay, and as seen from a distance presents a very imposing and picturesque appearance, heightened by the dazzling whiteness of its houses, which rise in terraces on the side of the hill. In consequence of earthquakes they are seldom built more than one story above the basement. On the summit and overlooking the town stands the Casbah, the castle in which the last dey lived. Its walls are 20 feet thick, and the interior consists of a large courtyard and some four or five stories of porches arched and pillared after the twisted spiral Byzantine order. It also contains several other houses and gardens adorned with sycamores and bananas. The city is enclosed by a wall 30 feet high and 12 thick, with towers and batteries. Each side of the harbor is defended by a strong battery. Many of the streets of Algiers, like those of other Moorish towns, are narrow and tortuous, but in the lower part of the city arcades have been built and the streets widened, giving the place a French aspect. All the streets now have French names. Algiers has a lighthouse, arsenal, dockyard, many mosques, banks, theatres, fountains, baths, factories, hotels, several synagogues, a handsome cathedral and three other Roman Catholic churches, a Protestant chapel, six colleges, an episcopal seminary, a government house, exchange, bishop's palace, and public library. In 1838 an episcopal see was established in Algiers, which in 1867 was elevated to an archbishopric. It is also the seat of a Protestant consistory, of an academy, a lyceum, an Arabic-French college, a museum, and other literary institutions. The governor general of the French possessions in Africa and other chief functionaries reside here. The port is a sheltered body of water of about 220 acres. It was first formed by Barbarossa in 1530; the French government have spent upon it upward of 20,000,000 francs. In 1862 a railroad was built between Algiers and Blidah, 30 m., and a telegraph cable was laid between Algiers and France. Algiers has become the entrepot of four fifths of the trade of the colony. Steam vessels start for this port from Toulon and Marseilles, and the passage is made in 48 or 50 hours. The commerce between France and Algiers is regarded as a coasting trade and reserved to vessels of French register only. The imports are chiefly coffee, sugar, wine, spirits, and cloths; and the exports, grain, wool, hides, tobacco, iron and copper ore, and coral.

ALGOA BAY, an indentation of the S. E. coast of Africa, in Cape Colony, about 425 m. E. of the Cape of Good Hope. It has excellent anchorage, and receives the Sunday river. Near Cape Recife, the W. point, is Port Elizabeth, the port of Uitenhage, 18 m. inland.

ALGOMA, a judicial district of the province of Ontario, Canada, forming the extreme N. W. part of the province, bordering on Lakes Superior and Huron, and extending E. as far as the most westerly branch of the French river; pop. in 1871, 4,807. The W. and N. boundaries are undetermined, but the area is probably not less than 40,000 sq. m. The district is divided into East, West, and Centre. In the first are Killarney, Spanish River, and Mississaga; in the second, Bruce Mines and Sault Ste. Marie; in the third, Batchewaning, Michipocoter, Pic St. Ignace, Nipigon, and Kaministiqua. The chief productions are timber and minerals; but though its pine forests have been worked for 20 years, the mines, rich in copper, silver, iron, and tin, were, with a few exceptions, neglected till 1871, when a large number of Americans engaged in silver mining, and by the end of that year about 20 mines had been opened, generally with great promise of success. The Lake Superior part of the district is probably one of the richest mineral regions anywhere known. In 1847 numerous companies were formed to work the mines, but most of them failed, and some years ago the government cancelled many of the grants and resumed the land. This district is approached by steamboats, which ply regularly in summer. Capital, Sault Ste. Marie.

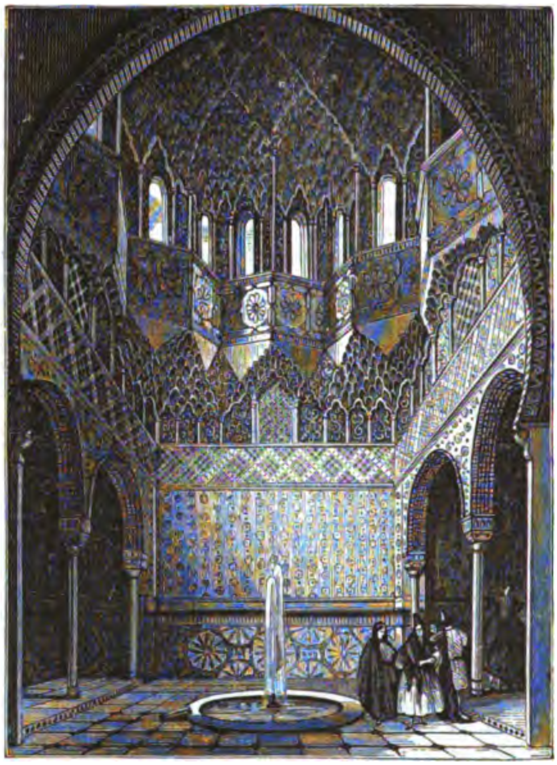
ALGONQUINS, a family of Indian tribes in North America, which at the commencement of the 17th century covered a vast region, bounded on the north and northeast by the Esquimaux, on the northwest by the Athabascan tribes, on the west by the Dakotas, and on the south by the Catawbas, Cherokees, Mobilian tribes, and Natchez, and extending from about lat. 37° to 53° N., and from lon. 25° E. to 15° W. of Washington. All the tribes of the family were nomadic, cultivating very little ground, and moving about in their own districts as hunting and fishing required. They resemble each other strongly in manners and customs, and the differences of dialect are easily traced to a common source. Within the same limits also dwelt the Winnebagoes, a Dakota tribe, in the west, and a large family of tribes extending from Lake Huron through the present states of New York and Ohio to North Carolina, and comprising the Wyandots or Hurons, Tionontatez, Neutres, Iroquois, Andastes or Susquehannas, Nottoways, Tuscaroras, and some smaller tribes, all of the same origin and language, but differing essentially from the Algonquins. The chief Algonquin tribes were the Crees, from Hudson Bay to Lake Superior; Nasquapees, on the Saguenay; Montagnais, on the St. Lawrence; Algonquins proper, on the Ottawa; Nipissings and Ottawas, on Manitouline; Chippewas, Menomonees, and Pottawatamies, on Lake Michigan; Miamis, Sacs, Foxes, Kickapoos, and Illinois, in the west; and on the Atlantic the Micmacs, Etechemins, Abenaquis, Sokokes, Massachusetts tribes, Pequods, Narragansetts, Mohegans, Lenni Lenape or Delawares, Nanticokes, the Powhatan tribes in Virginia, Pampticoes in North Carolina, and Shawnees in the south. West of the Mississippi were the Blackfeet and Cheyennes, regarded as isolated branches of the same family. Various dialects of the Algonquin have been studied and reduced to grammatical rules, by missionaries and others, Eliot's Indian Bible being the most extensive work published in it, while the labors of Eliot, Edwards, Roger Williams, House, Schoolcraft, Zeisberger, Du Ponceau, Gravier, Râle, Le Boulanger, Baraga, and Cuoq furnish the best data for study and comparison. At the beginning of the 17th century the Algonquins numbered apparently more than a quarter of a million; and the survivors must even now number 40,000.—There is no little confusion in the later writers as to the locality of the Algonquin tribe, from which the family took its name; but from the earlier explorers it is evident that they lived on the Ottawa river, the chief band being called also Kichisipirini (men of the great river). They were enemies of the Iroquois, and levied a sort of toll on all the canoes that passed down the river to trade with Europeans. They induced the French to join in the war against the Iroquois, but were almost annihilated by war and disease. The only remnant of the Algonquins is at the Lake of the Two Mountains. Their dialect has been modified by intermixture with the kindred Nipissings and Ojibways, so that its original dialectic forms are scarcely traceable.

ALGUAZIL, or **Alguacil,** in Spain, an inferior officer of the law, answering to a constable or bailiff. The alguazils are appointed by the judges, the *alguazil mayor* or head constable by the town council.

ALHAMA, the name of several towns in Spain, from the Arabic *al* and *hammiyat*, a warm bath. The most important is about 25 m. S. W. of Granada, picturesquely situated in the Sierra de Tejada; pop. about 7,500. Its mineral waters were in much request among the Moors, who drew a large revenue from the springs. The water is sulphurous, strongly impregnated with nitrogen gas, and on the surface a substance like oil may be observed; while in cold weather a sort of soapy substance is deposited on the pipes through which the water passes. In Roman times the site was occupied by Artigi (or Astigi) Juliensis, one of the chief inland cities of Bætica. It was afterward a Moorish stronghold, in which the treasury of the kings of Granada was guarded. It was captured by the Spaniards by a night assault in February, 1482.

The Alhambra, from the Albaycin.

ALHAMBRA (Ar. *Kal'-al-hamrah*, the red castle), a suburb of Granada, fortified in the strongest manner known to the middle ages, capable of containing 40,000 men, and enclosing the exquisite remains of a Moorish palace, whose beauties have been celebrated by all travellers, and admirably illustrated by the pen of Washington Irving. Situated in the midst of noble woods, surrounded by gardens, and built with sumptuousness and yet with taste, this beautiful spot contained everything that could contribute to the security and gratification of the Granadian princes. The Hall of Lions is the grand apartment of the palace; it is so called from a splendid fountain supported by lions, and is entirely constructed of marble and alabaster, and ornamented with the most delicate fretwork and arabesques. The Hall of the Abencerrages is still more beautiful. The ceiling is of cedar wood, inlaid with mother-of-pearl, ivory, and silver; and the walls are stuccoed and ornamented with arabesques of the most elegant and intricate design. The colors still retain their brilliancy, and the delicate filigree and tracery are in perfect order, after a lapse of 500 years. The principal building was begun by Ibn al-Ahmar in 1248, and finished by his grandson Mohammed III. about 1314, but the principal decorator was Yusuf I. Since the Castilian conquest of Granada it has undergone a series of disfigurements almost without interruption. Charles V. modernized some of its most characteristic portions in order to fit it for his own residence. Successive governors afterward pillaged it. The French blew up eight of the towers and tried to demolish the whole; and it is only within ten years that the remains have received intelligent care. The palace is now under the charge of a governor and a number of invalid soldiers. The Alhambra style is reproduced in a particular court in the crystal palace at Sydenham; and Owen Jones has published a work richly illustrated on the ornamentation and architecture of the Alhambra.



Interior of the Alhambra—Hall of the Abencerrages.

ALHONDEGA, a fortified granary in the suburbs of Guanajuato, Mexico, which gives its name to the first battle between the insurgents and the troops of the mother country in 1810. After the priest Hidalgo had taken up arms, he first endeavored to attack Guanajuato, against which he marched Sept. 28. Riañon, the commander, did not attempt to defend the city, but shut himself up with the Spanish troops and old Spaniards in the Alhondega. The Spaniards were well armed, and the troops of Hidalgo, except two creole regiments, were equipped with slings, bows, pikes, *machetes* or cane knives, and clubs. The Indians assaulted the place with great gallantry, charging up to the Spanish artillery, which they sought to muzzle with their hats and blankets. On the other hand, the Spanish fire did fearful execution, until at last, the guns being without balls, shells were improvised by filling with powder the iron flasks in which quicksilver was brought from Spain, and firing them among the assailants. It has also been said that bags of dollars were used instead of grape-shot by the desperate defenders. At last Riañon was killed, the works were carried by storm, and the whole garrison was massacred. The number of victims is estimated at 2,000, one family alone having lost 17 members. The battle terminated on Friday night, and on Saturday morning not a Spaniard was alive in the city, and the very houses they had occupied were destroyed.

ALI, pasha of Janina, born at Tepeleni, Albania, about 1741, executed in February, 1822. His family had for generations held the town and territory of Tepeleni as a fief from the pasha of Berat. His father, having been driven from his home by his own brothers, afterward besieged them at the head of a troop of klephts and burned them alive. His mother, of the wealthy Kamco family, was noted for her ferocious character. At her instigation the young Ali affiliated with brigands, and having regained his father's estates, made marauding incursions into neighboring territories. His subsequent alliance with the pasha of Janina, and the extent of his depredations, subjected him for some time to the displeasure of the Porte; but after the execution of his father-in-law, the pasha of Delvino, and the marriage of the latter's successor with Ali's sister, he acquired supporters at the divan, and procured the appointment of sub-inspector of highways, in which post he compounded with robbers for a share of the booty. His superior was beheaded, while Ali saved himself by timely presents at Constantinople. During the war of 1787 and the succeeding years, between the Porte and Russia and Austria, Ali Pasha, though keeping up a treasonable correspondence with the Russians, rendered good service to Turkey. He obtained the appointment of inspector of public highways, with peremptory orders to suppress brigandage. Levying a strong force, he soon carried out his instructions, and having cleared the roads and made war on his former ally, the pasha of Janina, he concocted a forged order from the Porte under which he occupied that pashalic, the subordinate beys of which were in a state of open revolt. His public services, and still more his bribery, procured him the appointment to the pashalic in 1788, and by force or fraud he extended his dominion over the greater part of northern Greece. He seized the Venetian territories on the coast of Albania so soon as the French army occupied the Italian possessions of the republic in 1797, and opened a negotiation with Napoleon for his support in case the French expedition against Turkey should succeed. Napoleon sent M. de Pouqueville to Janina; but on the defeat of the French in Egypt Ali Pasha sided with the Turks and the English, and assisted in driving out the French from Prevesa and Parga (1802). He carried on a war of extermination against the Suliotes, an independent Christian mountaineer population of Epirus, and subdued them (1803) after three years' heroic resistance on their part. He still continued to keep up a show of allegiance to the Porte, by which he was appointed governor general of Roumelia. His schemes of aggrandizement were notorious, but he bribed Turkish officials, and never openly set the power of the Porte at defiance. This cautious policy was at last forgotten. Ismail Pasha, a former confidant of Ali, held an appointment at Constantinople. Ali, either from revenge or fear of disclosures, hired assassins to kill him. The attempt having failed, the assassins made a full confession. Ali was now outlawed. An army marched against him, which he at first repulsed (1821), but at last, besieged by Kurshid Pasha in Janina, and deserted by his Ottoman adherents, he retired to a stronghold on the lake, in which he kept his treasures and his magazine, threatening to blow himself up unless he received an amnesty. The cupidity of the Turks being aroused by his treasure, it became important to secure the place. The incidents of the closing scene are variously narrated; but the general facts are that he was deluded by a pretended firman of pardon into a personal interview with Kurshid Pasha, in which he was attended by a small body of his officers. In this interview the sultan's commands for his decapitation were made known, on which Ali Pasha immediately fired at his enemies, and killed or wounded some, but was himself shot dead. His head was cut off and sent to Constantinople. Only about 20,000,000 francs of his money were found by the Turks. His daughters were sold as slaves; his sons were all put to death; his daughter-in-law was dishonored and drowned. As he contributed to the prosperity of the territories under his rule, he was regarded as rather an enlightened ruler by many Englishmen, including Lord Byron, who visited him at Janina.

ALI (Ali ben Abu Taleb), a Mohammedan caliph, reigned 655-661. He was adopted and brought up by Mohammed, his blood relation, married the prophet's daughter Fatima, and is believed to have been his first disciple. On the death of Mohammed without male issue, he had claims as next of kin to the succession; but he deferred to those of Abubekr, Omar, and Othman, who were successively elected by the Moslems, and were supported by Ayesha, the prophet's widow, an inveterate enemy of Ali. It was not till after the assassination of Othman that he assumed the sovereign power. The question of his right to the succession divides the Mohammedan world into the two great sects of Sunnis and Shiahs, the former denying Ali's right, the latter affirming it. Ali's first act of power was the suppression of a rebellion fomented by other pretenders to the crown, who were abetted by Ayesha. The rebels Zobaïr and Talha were defeated and slain, and Ayesha was taken prisoner. A new opponent soon arose in Moawiyah, who succeeded in establishing himself in Damascus, and even carried the war into Ali's own territories and seized the two holy cities. Three fanatics, having determined on ridding the world of both pretenders, succeeded in killing Ali, but failed in their attempt on the life of Moawiyah. Ali left three sons, one of whom, Hassan, succeeded him for a short time.

ALIBAUD, Louis, a Frenchman notorious for his attempt to murder Louis Philippe, born at Nîmes in 1810, died on the scaffold, July 11, 1836. In his 18th year he entered the army as a volunteer. During the revolution of 1830 he went over to the popular side, and was wounded at the barricades. Invalided in 1834, he resided alternately at Perpignan, Barcelona, and Paris. His attempt to shoot the king, inspired by political fanaticism and a morbid satiety of life, was made June 25, 1836, as his majesty was leaving the Tuileries in his carriage. Being instantly seized by the soldiery, his only regret was that he had failed in his endeavor.

ALIBERT, Jean Louis, a French physician, known for his study of cutaneous diseases, born in Villefranche, May 26, 1776, died in Paris, Nov. 6, 1837. His inaugural thesis, on "Pernicious Intermittent Fevers," passed through five editions and had an unusual success for a treatise of that nature. About 1803 he was appointed physician to the hospital St. Louis in Paris, and immediately began the investigation of diseases of the skin, publishing in 1806 the first numbers of his great work on cutaneous diseases. In 1821 he was appointed to the chair of therapeutics in the faculty of medicine. He wrote on a variety of medical subjects, and was remarkable for an elegant style. He was one of the founders of the *société médicale d'émulation*, and several of the addresses which he pronounced before this society did much to establish his literary reputation. He was physician in ordinary to Louis XVIII., by whom he was created a baron and officer of the legion of honor. He was also physician to Charles X. His principal works are: *Traité des fièvres per-*

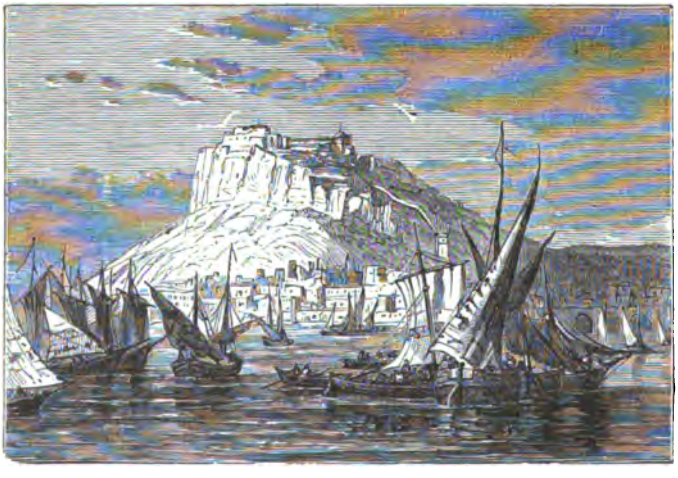
nicieuses intermittentes (1804); *Description des maladies de la peau observées à l'hôpital St. Louis* (large folio, with 51 plates, 1806–'26); *Précis théorique et pratique sur les maladies de la peau* (1810–'18); *Physiologie des passions, ou nouvelle doctrine des sentiments moraux* (1825); *Monographie des dermatosés* (1832); *Clinique de l'hôpital St. Louis* (1833).

ALI BEY, a Caucasian slave, who, by the favor of his master, Ibrahim Bey, rose to wealth and importance in Egypt, and became one of the Mameluke beys, born in 1728, died in 1773. He became chief of the Mamelukes in 1763, and, having secured himself adherents in Cairo, he slaughtered the other beys in 1766, and assumed the government, proclaiming himself sultan in 1768. The Porte, then occupied with war against Russia, left him uncontrolled. His idea, derived from intercourse with Europeans, was the restoration of the Egyptian kingdom. He formed an alliance with Daher, pasha of Acre, and they seized on Mecca, and sent a fleet into the Red sea. In 1770 they overran Syria, and Daher and Mohammed, Ali's general and adopted son, having routed the Turkish army, were on the point of rendering themselves masters of the country, when Mohammed, either alarmed for himself or gained over by the Turks, precipitately quitted the army, and, returning to Egypt, engaged in a war against Ali, who fled. The latter, however, renewed the contest jointly with Daher, and for a time with great success, but was finally captured in battle and slain.

ALICANTE. **I.** A S. E. maritime province of Spain, forming a part of the former kingdom of Valencia; area, 2,096 sq. m.; pop. in 1867 (estimated), 426,656. One half of the province consists of a bare chain of high mountains, with partly sterile steppes, without trees or water; but the southern portion is generally level and fertile, with a mild climate, and agriculture flourishes. Among the products are mineral salt, sea salt, and esparto, besides silk, grain, and fruits of all kinds. The chief river is the Segura. The principal towns, besides the capital, are Alcoy, Denia, Villajoyosa, Jijona, Monovar, Elche, and Orihuela. **II.** The capital of the province, and the principal port of Valencia, on a bay of the Mediterranean, 230 m. S. E. of Madrid; pop. about 32,000. It is situated partly on the slope of a hill 400 feet high, on the top of which is a strong castle, and partly on the shore of the bay. The latter portion is modern and elegant. From the northern slope of the mountain is produced the celebrated Aloque wine. The commerce of Alicante was formerly extensive, but has decreased during the last 20 years. The chief exports are raisins, almonds, olive oil, saffron, and vanilla. The city has a cathedral, a government tobacco factory employing about 4,500 girls, and a bull ring capable of seating 11,000 persons.

ALICATA. See Licata.

ALIEN, a person who was born out of the jurisdiction and allegiance of a country, and who is not a citizen of that country. Not all foreign-born persons are aliens by our law, because they may be within certain excepted classes, as the children of the nation's ambassadors born in other countries, or of American citizens temporarily sojourning abroad; or they may have become citizens by naturalization. In the United States citizenship and alienage are determined by the laws of the federal government. The subject of naturalization under these laws is treated elsewhere. (See Naturalization.)—Attica, the foremost state of ancient Greece, treated foreigners with much liberality. While Sparta was jealous of strangers and excluded them, at Athens foreigners were freely admitted, and at one time constituted half her residents. They were subjected to taxes and to some other light burdens and disabilities which were not imposed on native citizens; but on the whole the policy observed toward them was humane and generous, and sometimes they were received into citizenship. In other states of Greece individuals and sometimes whole classes of aliens were endowed with civil rights, such as the privilege of intermarriage, of holding real property, and of exemption from special taxation. In Rome, under the emperors, foreigners could acquire and dispose of property, could devise and inherit it, and sue in the courts; and they enjoyed other rights accorded by the *jus gentium*, that is to say, the mere natural rights of persons, though



Alicante.

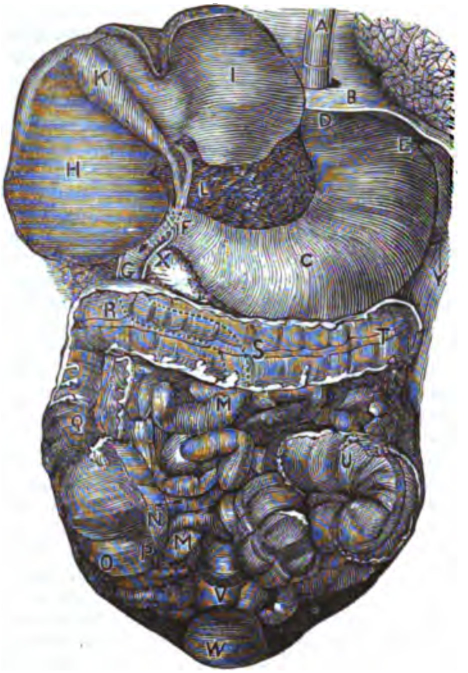
they were deemed the especial and distinctive privilege of Roman citizens. In Germany and France, in the later periods, foreigners were not only denied civil rights, but were forced to invoke the protection of the native barons or seigneurs, who imposed the heaviest exactions as the price of their protection. In France, in some districts, the alien was forbidden, after a certain term of residence, to leave the lord's domain; and if he died within it, leaving no heirs there, the lord claimed the right of succession to his property. This prerogative of the seigneurs, later assumed by the sovereign himself, was what in modern times was known as the *droit d'aubaine*. It has existed down to a very recent period in Europe, at least in the milder form of the *droit de détraction*, and practically exists now, or did only a few years ago, as Mr. Attorney General Cushing suggested, in many of our own states; and it is the subject of clauses in some of our latest treaties with European powers. This *droit d'aubaine*, as it was asserted by the king of France, consisted sometimes in a right to levy a tax on strangers on certain occasions, and sometimes in the claim of inheriting to strangers who left no heirs within the kingdom. It was abolished in France in 1790, restored by the *Code Napoléon* on the plea of reciprocity, and abolished finally in 1819, when the right of succession was conceded to foreigners to the same extent as it was enjoyed by native-born Frenchmen. The French legislation has had the effect to break down this exaction in other European states; but Great Britain and the United States have not been so liberal. A very recent treaty with Prussia, which will illustrate the present international practice on this point, contained provisions intended to relieve the subjects of Prussia from their disabilities in respect to real and personal property here, and declared that on the death of such an alien in possession of property, his heirs should have reasonable time to sell it and withdraw the proceeds, "exempt from all droits of detraction on the part of the government of the United States." Soon after the conclusion of this treaty, the Prussian minister complained that his countrymen did not enjoy in all our states the benefit of the treaty stipulation, and the question arose whether the federal government could make a treaty whose provisions of this character could bind the states; for though the federal government has supreme and exclusive cognizance of questions of citizenship and alienage merely, yet each state is at liberty to make its own laws in relation to the enjoyment and devolution of property within its own limits. The opinion of the attorney general was very clear and explicit to the effect that the treaty-making power of the general government must bind the states as to the provisions in question. But, so far as appears, no decision on the subject has ever been made by the courts.—As to real property, subject to the right of forfeiture in the state or sovereign, aliens under the common law may take by act of the party, as the phrase is, though they may not take by act of the law. In other words, an alien may take real estate by purchase, or even by devise, these being acts of parties; but he cannot take by inheritance, for that is a mere operation of the law. When the alien takes, as in the two former cases, the estate vests in him, and he may hold it against every one but the state; nor can the state enforce its right of forfeiture without proceedings for that purpose, or, in legal phraseology, without an inquest of office found. Until this is done, the alien may exercise complete legal domain over the property, just as a citizen may do. But though he may sell it, his grantee takes no better title than the alien had, and he is therefore as liable to forfeit the lands as the alien was. At common law, as just implied, the alien has no inheritable blood, that is to say, he can neither take nor transmit real property by descent. Thus it was formerly held that a grandson could not inherit to his grandfather, though both were native-born subjects, if the intervening son, the grandson's father, were an alien. But a statute was passed in the reign of William III. which cured this disability, by providing that native-born citizens might inherit to their ancestors, notwithstanding the alienage of any intervening ancestor. This statute was reënacted in 1830 in New York, and in many other states before that time.—The disabilities of aliens in respect to real property have been materially lessened in most of our states; and in some they are entirely removed, as in Massachusetts, Maryland, Florida, Ohio, Illinois, Iowa, Wisconsin, Nebraska, Dakota, and Nevada. In New York, South Carolina, Texas, and many others, the alien may take, hold, and devise lands after declaring his intention to become a citizen in conformity with the naturalization laws. In Connecticut and California the alien, if a resident in the state, may purchase, hold, inherit, and transmit lands in the same manner as a citizen. The right of forfeiture, it should be observed, is very rarely exercised by the states; on the contrary, the legislatures are very liberal in making laws to cure defects of titles arising out of the alienage of former holders, and in releasing in favor of the natural heirs the right of escheat which may have accrued to the state by the death of an alien ancestor in possession of lands.—In respect to personal property, aliens may at common law take, hold, and dispose of it, and make and enforce contracts in respect to it, just as native citizens may do. An alien in New York may take a purchase-money mortgage on land sold by him, and on a foreclosure may buy and hold the land. But it is doubtful whether he could make such a purchase on foreclosure of his mortgage on lands in which he never had any other title than the mortgage. The revisers in 1830 proposed a section to confer the power, but it was not adopted.—An alien enemy, that is to say, the subject of a state actually at war with us, cannot maintain an action in our courts, unless he is here by license of our government or is otherwise under its protection. But an alien friend, whether resident here or not, may sustain in our courts an action like our own citizens for any injury to his person or rights. As to non-resident aliens, an illustration of the rule is furnished by the suits for infringement of trade marks in this country, which have been in several instances maintained by English manufacturers. Suits by or against aliens, whether living here or abroad, to which a citizen of the United States is an opposite party, may be brought under the laws of the federal government in the United States circuit courts; and suits by aliens for torts in violation of the law of nations may be brought in the district courts. Upon the outbreak of a war with the alien's country his civil capacity to sue is suspended, and his property is subject to confiscation. A statute of the United States of 1798, still in force, provides that in such an event the subjects of the hostile nation within our territory may be restrained, secured, or removed as alien enemies, though they shall be allowed such time for removal of their effects as is provided by treaties with their countries. Aliens are incapable of serving on juries, voting, or holding office. Where they can hold property, they are generally subject to militia duty and the other burdens and taxes of citizens. The practice of trying aliens by a jury *de medietate linguæ* (half aliens) has fallen into general disuse. The power to expel aliens from the state is vested in France in the minister of the interior, and in England and America theoretically in the executive, though it has never been exercised in either of the two latter countries except in pursuance of an act of parliament or of congress. Such an act was passed in England in 1848, but a report made in 1850 showed that it had not been enforced in a single instance.—In England some important points of the law respecting aliens have been lately settled by the enactment of the naturalization act of 1870. It declares that henceforth real and personal property of every description may be taken, acquired, held, and disposed of by an alien, in the same manner in all respects as by a native-born British subject; and that a title to real and personal property of every description may be derived from, through, or in succession to an alien, as it may be from a native citizen of the kingdom. The act also provides that any alien naturalized in Great Britain may make a declaration of alienage after proclamation of any treaty with his native state which insures that privilege for its subjects; and also that any person born out of her majesty's dominions of a British father may, if of full age and under no disability, make a declaration of alienage. From the passage of the act no alien shall be entitled to be tried by a jury *de medietate linguæ*, but shall be triable like a native British subject. Provisos of the act declare that its terms shall not qualify an alien for any office or for any municipal, parliamentary, or other franchise, nor enable him to enjoy any rights or privileges as a British subject, except the rights and privileges as to property conceded by the act. Other significant but less important provisions are contained in the statute.

ALIGHIERI, Dante degli. See DANTE.

ALIGHUR, or Allygurh. **I.** A district of British India, in the Meerut division of the North-western Provinces, between lat. 27° 27′ and 28° 11′ N., and lon. 77° 32′ and 78° 47′ E.; area, 2,149 sq. m.; pop. about 1,200,000. With the exception of a ridge near the middle of the district, the surface is almost level. The crops are wheat, barley, millet, pulse, indigo, cotton, tobacco, and sugar. At the beginning of this century Alighur was the seat of power of the French adventurer Perron. **II.** A fort in the preceding district, 55 m. N. of Agra, on the road to Meerut. It was held by Perron with a force of Mahrattas in 1803, and was stormed by the British Sept. 4, about 2,000 of the garrison falling in the assault. A regiment of sepoys mutinied here in May, 1857, and held the place till October, the English escaping without loss of life.

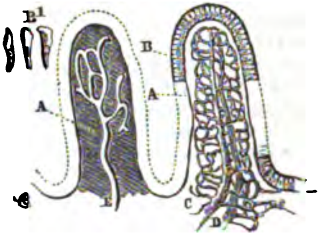
ALIMENT, or Food, all the solid and liquid substances requisite for the nourishment of the body. The living body is in a constant state of change. Every one of its motions, every exertion of the voluntary muscles, even the contractions of the heart and the movements of respiration, are attended by the disintegration of some portion of the tissues, which must be renovated in order to maintain their vital activity. This constant waste of tissues demands a corresponding supply of food, by which the loss may be made good. Properly speaking, all the ingredients of the body constantly require to be replaced, and must therefore form a part of the food. Alimentary materials are accordingly divided into groups, distinguished from each other by certain characteristics. 1. The first comprises the inorganic substances proper, namely, water and the mineral salts. They are all essential as ingredients of the food, since they form an essential part of the bodily frame. Of these inorganic substances, water is the most abundant and the most constantly indispensable. It forms from two thirds to three quarters of the entire mass of the human body, and is constantly discharged from the body by the perspiration, the respiration, and the urine. The water thus lost must consequently be replaced by that which is taken with the food and drink. The quantity of water taken in to supply the wants of the system is for an adult man, on the average, about 4½ pounds per day. Of the mineral salts which are necessary constituents of the body and of the food, chloride of sodium, or common salt, and phosphate of lime are the most important. They exist in greater or less abundance in every one of the solids and fluids of the body. Chloride of sodium, for example, is present in the blood in the proportion of 4⅓ parts per thousand; and phosphate of lime exists in the bones and other solid tissues in much greater proportion. Both these substances are also ingredients of the food. Chloride of sodium is found in muscular flesh, or lean meat, in the proportion of two parts per thousand, and we are also in the habit of adding it to the food as a condiment. Breeders of sheep, cattle, and horses always find that a liberal supply of common salt improves greatly the condition of the animals. Phosphate of lime exists in the muscular flesh of animals, in fish, oysters, eggs, in the cereal grains, in peas, beans, potatoes, beets, turnips, &c., and even in most of the juicy fruits. The alkaline salts, the carbonates of soda and potassa, are also necessary to the nourishment of the body; since the blood and most of the secretions must have an alkaline reaction, and this reaction is for the most part communicated to them by the presence of the carbonates of soda and potassa. Unlike the mineral salts, however, the alkaline carbonates are not usually introduced into the body under their own form. Many of the summer fruits and vegetables contain salts of soda and potassa combined with various organic acids, such as the malates, tartrates, and citrates of these bases. These salts are decomposed in the interior of the body, and their vegetable acids replaced by the carbonic acid. Thus they become alkaline salts, and provide for the proper constitution of the animal fluids. 2. Another group of the alimentary substances comprises starch and sugar. These two resemble each other in their chemical constitution, being composed of carbon, hydrogen, and oxygen alone. They are further connected by the fact that starch may by various means be converted into sugar. The readiest mode of doing this is perhaps by boiling with a dilute acid. If 320 grains of starch be boiled for five hours with about two fluid drachms of sulphuric acid in a pint of water, it will be found to have lost the properties of starch and acquired the sweet taste and other characteristic qualities of sugar. There are various other modes by which the same change may be accomplished; and in fact in very many instances, if not in all, in which sugar is formed in the juices of vegetables, it has first appeared in the form of starch. Of the substances belonging to this group, the different varieties of starch are the most abundant. Starch is found, in the form of minute rounded grains, in a vast number of vegetable productions. It is abundant in wheat flour, in rice, Indian corn, rye, barley, oats, potatoes, peas, and beans, and enters in smaller proportion into nearly every article of vegetable food. In the process of cooking, or heating the starch in contact with water, its grains swell up, become softened, absorb water, and at last, if the heat be sufficiently long continued and the water sufficiently abundant, they fuse together into a gelatinous, homogeneous mass. In this condition they are much more digestible than in the raw state, and it is in this form that starch is almost always actually used as food. Sugar is also taken not only in its purified form, as an addition to other substances, but also as a natural ingredient in the sweet juices of nearly all the fruits and most vegetables. Wheat flour contains 5 per cent. of sugar, milk nearly 5 per cent., beets 9 per cent., pears over 10 per cent., and peaches and cherries from 16 to 18 per cent. Vegetable substances containing starch and sugar are always useful, and in the long run indispensable for maintaining health in the human species. A diet exclusively composed of meat and other animal substances becomes after a short time exceedingly distasteful, and an almost irresistible desire is experienced for food of a vegetable origin. This is an instinctive demand of the system. Even dried or preserved vegetables will not answer the purpose indefinitely, for there is something in the fresh vegetable juices which is essential to health; and if fresh vegetables are excluded from the food for a long time, all the symptoms of scurvy begin to manifest themselves, showing a generally disordered condition of the nutritive functions. 3. A third group of alimentary materials comprises the fats. These substances, like starch and sugar, consist of carbon, hydrogen, and oxygen as their chemical elements, but the proportions in which the elements are combined are not analogous to those in the former group; and the fats have other distinctive characteristics also. They are both of animal and vegetable origin. They constitute the greater part of the adipose tissue or fat of animals, more than 25 per cent. of the yolk of eggs, the whole of the butter derived from cow's milk, 9 per cent. of Indian corn, 32 per cent. of olives, and in walnuts and filberts as much as 50 or even 60 per cent. Fat, in some one or more of these forms, is extremely useful and perhaps indispensable as an article of food. The fact that it constitutes over 3¼ per cent. of human milk, which is the first and exclusive food of the infant, shows this to be the case, at least for that age; and the general desire which is felt by the healthy appetite for a certain proportion of fat is a sufficient indication of its importance. 4. The last group of alimentary materials comprises albuminoid substances. (See ALBUMEN.) They are distinguished from both the starchy and fatty substances by the fact that they all contain nitrogen; and they are sometimes designated as the nitrogenous elements, in distinction from the others, which are non-nitrogenous. The albumen of the white of egg is one of the most important and familiar. A substance very similar in composition to albumen, namely, musculine, forms the principal mass of muscular flesh, and is the chief ingredient in lean meat used for food. Caseine is present in milk, and in a coagulated form constitutes the principal part of cheese. Legumine is found in peas and beans, and gluten is the albuminoid ingredient of wheat flour. Altogether, an adult man usually consumes rather more than a quarter of a pound of albuminoid matters (calculated in the dry state) during 24 hours.—No one of the groups of alimentary materials enumerated above, taken singly, is sufficient for the continued nourishment of the body. This is sufficiently evident for the inorganic substances, such as water and the mineral salts. Vegetables have the power of assimilating these matters, and converting them into the ingredients of the vegetable fabric; but animals require for their nourishment materials which are already animal or vegetable in their nature. But even these substances, combined with starch, sugar, or oil, are also insufficient. Dumas and Milne-Edwards found that bees fed upon pure sugar and water soon ceased to work, and afterward perished. They thrive only when supplied with waxy and other vegetable substances in addition. Magendie found that dogs fed upon starch and sugar, or upon an exclusive diet of fat, became after a time debilitated, and died with symptoms of great disturbance of the nutritive functions. Boussingault fed a duck upon butter alone; but, although the quantity of this alimentary substance was abundant, namely, from 1,350 to 1,560 grains per day, the animal at the end of three weeks died of inanition. All the tissues of the body were infiltrated with oleaginous material, but this substance had proved incapable of supporting life. Lehmann put himself upon a regimen consisting solely of non-nitrogenous substances, such as starch, sugar, gum, and oil, but was only able to continue this course for two or at most for three days at a time, owing to the disturbance of the general health produced by it. The unfavorable symptoms, however, rapidly disappeared on his resuming an ordinary mixed diet. The substances just mentioned being deficient in so important an element as nitrogen, this was at one time regarded as a sufficient explanation of their inability to sustain life; and the albuminoid or nitrogenous materials were therefore supposed to be the only absolute and completely nutritious ingredients of the food. Direct experiment, however, showed that these substances themselves, when taken alone, were also insufficient. Magendie fed dogs upon pure gelatine and pure fibrine, and found at the end of some days that the animals lost their relish for the food, became emaciated, and died with symptoms of inanition. To be completely nutritious, therefore, the food must contain not one but all of the groups of alimentary substances, and these substances must be present in their true proportion. This shows the futility of the attempts which have sometimes been made to fix the nutritive value of different kinds of food by ascertaining their ultimate chemical composition, and particularly by the amount of nitrogen which they contain. The nutritious qualities of an article of food depend upon the proportion of its different ingredients, not only as taken alone, but also as used in combination with other substances. Its digestibility and the extent to which it conforms to the appetite and natural taste are also important elements in the question. The nutritive value of an article can therefore only be determined by direct experiment and observation; that is, by employing it as food, alone and in combination. Thus all those substances which are found by universal experience to be the most useful are distinguished by a variety of composition. Milk, which for the young infant is during a certain period the only food employed, contains water, mineral salts, caseine or an albuminoid ingredient, butter or fat, and a peculiar variety of sugar. Eggs contain albumen, water, fat, and salts. Wheat flour, as well as the bread which is made of it, contains gluten, water, salts, starch, and a small quantity of sugar. In practice, at least for adults, a judicious variety in the diet is found to be indispensable for the maintenance of health.—Of all articles of food, bread is perhaps the most important. The best and most nutritious bread is that made from wheat flour. The flour contains, in 100 parts, on the average, 72 parts of starch, $7\frac{3}{10}$ parts of gluten, $5\frac{4}{10}$ parts of sugar, and 12 parts of water, together with gum, phosphates of lime and magnesia, alkaline sulphates, and a little chloride of sodium. It is first kneaded into a paste with about one half its weight of water, a little yeast added and thoroughly mingled with the mass by continued kneading, and the dough then allowed to remain for some hours at a moderately warm temperature. During this time the yeast excites in the sugar of the flour a fermentation, by which it is converted, as in ordinary fermentation, into alcohol and carbonic acid. The alcohol penetrates the dough and escapes by evaporation. The carbonic acid, however, is developed throughout the dough in the form of minute gaseous bubbles, which are confined and entangled by the tenacious gluten of the flour; and the whole mass thus becomes inflated or puffed up by the gaseous expansion. This is the rising or fermentation of the dough. It is then transferred to an oven and kept there at a temperature of about 380° F. until the baking is complete. The effect of baking at this high temperature is as follows: First, the starch upon the outside of the loaf is converted into dextrine and hardened into a brownish, brittle layer, which is the crust; secondly, the gluten throughout is also solidified and at the same time acquires an agreeable and wholesome flavor; thirdly, the starch grains become swollen, fused, and hydrated, fixing permanently in their substance a certain proportion of the water with which the flour was mingled. Thus, after baking, the bread always weighs more than the flour of which it was made, owing to the necessary combination of water with the starch in the baking process. Usually one pound of flour is found to produce in this way one pound and a quarter of bread. When removed from the oven and cut open, the interior of the loaf is seen to present a spongy appearance, owing to a multitude of little cavities distributed through its substance. These are the cavities originally produced by the bubbles of carbonic acid developed in fermentation, and which retain their figure in consequence of the stiffening and coagulation of the gluten by the baking process. This is one of the main objects of fermentation; for the spongy texture which the bread thus receives enables it to be more easily masticated and mingled with the saliva and gastric fluids, and thus renders it more healthy and digestible.—Cheese is made by coagulating the caseine of milk with rennet, after which the coagulum is compressed, in order to free it from the watery, oleaginous, and saline ingredients of the milk; and when reduced to a sufficiently solid condition, it may be kept for an indefinite time. In many kinds of cheese, however, more or less of the oily ingredients of the milk are retained entangled with the caseine, by which it acquires a richer and stronger flavor. Butter, on the other hand, is simply the oleaginous portion of the milk, separated from the remaining constituents. In the natural condition of the milk the butter is in the form of microscopic globules, or spherical masses, of a semi-solid consistency, suspended in a state of minute subdivision in the serous liquid. By the operation of churning, these little globules are made to cohere mechanically together, and gradually the whole of the oleaginous substance is separated in a distinct pasty mass. It is still further freed from the accompanying ingredients of the milk by pressure and kneading under water, and is finally obtained as butter in a nearly pure condition.—The effect of cooking upon food is twofold. In the first place, it softens and disintegrates the substances which are naturally too hard for digestion, and thus renders them amenable to the digestive operations. This is the effect produced upon many vegetable substances, such as starch grains wherever they may be found, and all substances having a resisting envelope or a tough and solid texture, such as peas, beans, potatoes, turnips, and the like. In animal substances, on the other hand, the most useful effect of cooking appears to be the partial transformation of the albuminoid matters, as in roast meat, by which they acquire a peculiar and agreeable flavor. There is reason to believe that this flavor, besides being pleasant to the palate, is also the indication of a chemical change in the albuminoid matters, by which they are prepared for digestion and become better fitted to subserve the nutrition of the body.

ALIMENTARY CANAL, a tubular passage, existing in man and all the higher animals, composed principally of a muscular layer and a mucous membrane, extending from the mouth to the anus, and designed for the reception, transmission, and digestion of the food or aliment. The cavity of the alimentary canal is continuous, anatomically, from its commencement to its termination, forming a hollow passage through which the food is carried in the digestive process. Its different parts are, however, partly separated from each other at various points by constrictions and muscular bands, which are alternately closed and opened, to allow of the temporary retention or onward movement of the alimentary materials. The different portions of the canal are also distinguished from each other by varieties of form and size, the development of their muscular layers, and the structure of their mucous or lining membrane. Owing to this variety of structure, and the different characters of the secretions produced, the action of the alimentary canal upon the food varies in its different parts; and the process of digestion to which the food is subjected consists of the successive or combined operation of the whole. The principal portions into which the canal is thus divided, in the human subject, are known as the mouth, the œsophagus, the stomach, the small intestine, and the large intestine.—The mouth is the cavity included between the opening of the lips in front and the fauces behind. In it are the teeth, intended for the mastication and comminution of the food; the tongue, a muscular and sensitive organ, which subserves both the sense of taste and the proper movement and admixture of the food in mastication; and a lining membrane which contains mucous glandules destined to supply a viscid secretion forming part of the saliva. There are also the parotid, submaxillary, and sublingual glands, situated in the immediate vicinity of the mouth, which pour their secretions into its cavity, and thus complete the formation and supply of saliva, which is mingled with the food in mastication and reduces it to the condition of a soft, pasty mass.—Immediately behind the fauces is the pharynx, a short funnel-shaped passage leading directly to the œsophagus. The latter is a nearly straight tube of uniform size, about nine inches long and rather less than one inch in diameter. It passes through the neck and posterior region of the chest to the upper part of the abdomen, where it terminates in the stomach. It has a double layer of transverse and longitudinal muscular fibres, by whose peristaltic or wave-like contractions the masticated food is rapidly carried from above downward. Its lining membrane is of a simple structure, and produces only a small quantity of mucus, destined by its lubricating qualities to facilitate the passage of the food. The œsophagus, in fact, is simply an organ of transmission, by which the food is transferred from the mouth to the stomach, where the more important digestive actions are to begin.—The stomach is a dilatation of the alimentary canal, lying transversely across the upper part of the abdomen. Toward the left side it expands into a wide hemispherical sac or pouch; toward the right side it becomes narrowed to a smaller diameter, where it united with the upper extremity of the intestine. The orifice by which the stomach communicates with the œsophagus is called the cardia (Gr. *καρδία*,



Abdominal Portion of the Alimentary Canal.

A, œsophagus; B, diaphragm; C, stomach; D, cardiac extremity of the stomach; E, great pouch; F, pylorus; G, duodenum, H, right lobe of liver; I, left lobe of liver; K, gall bladder; L, bile duct; M, small intestine; N, entrance of small intestine into the large intestine; O, cæcum; P, appendix vermiformis; Q, ascending colon; R S T, transverse colon; U, sigmoid flexure; V, rectum; W, urinary bladder; X, pancreas; Y, spleen.



Two Villi of the Small Intestines.

A, substance of the villus; B, its epithelium, of which some cells are seen detached at B^1; C D, the artery and vein, with their connecting capillary network, which envelopes and hides the lacteal radicle, E, which occupies the centre of the villus and opens into a network of lacteal vessels at its base.

the heart), because it is situated near the heart; that by which it communicates with the intestine is called the pylorus (Gr. *πυλωρός*, a gatekeeper). Both are provided with a special circular bundle of muscular fibres by which the food, once in the stomach, is retained there for a time, to allow of the secretion and operation of the gastric juice. The gastric juice is secreted by the mucous membrane of the stomach, which is soft, glandular, and vascular in texture, and, when stimulated by the contact of the food, pours out the gastric juice in considerable abundance, as the perspiration is exuded by the skin.—Next the stomach follows the small intestine. This is a tubular canal about 25 feet in length and between one and two inches in diameter. It is thrown into numberless folds and convolutions, by which, notwithstanding its great length, it occupies a comparatively moderate space in the abdomen. It is attached to the abdominal portion of the spinal column by a thin, flexible membranous sheet termed the mesentery, which, while retaining it in its proper position, allows of the necessary movement of its different convolutions upon each other. Its muscular layers are well developed and active, and by their contractions continuously urge the semi-fluid ingredients of the food through the tortuous windings of its internal cavity. Its mucous membrane is provided, first, with a great number of glandular follicles which secrete the intestinal juice, one of the active agents in digestion; and secondly, with minute filamentous vascular prominences or villi, which are so abundant and thickly set as to give its internal surface a velvety texture, and which by their absorbent action take up from the intestine the nutritious elements of the digested food. Into the upper part of the small intestine, a few inches below the stomach, there are also discharged two accessory secretions, namely, the bile from the liver, and the pancreatic juice from the pancreas. The small intestine terminates, in the lower part of the abdomen on the right side, by a junction at right angles with the large intestine.—The large intestine, so called from its greater capacity as indicated by a transverse measurement, is about five feet long, and from 1½ to 2½ inches in diameter. It extends from its commencement in the right iliac region (see ABDOMEN) upward on the right side of the abdomen, then transversely across to the left side, then downward upon the left side, then through an S-like convolution to the top of the pelvis, and finally through the cavity of the pelvis to the anus. At the point of junction of the small with the large intestine there are two parallel folds of mucous membrane, with their edges turned toward the cavity of the large intestine, which act as a double valve (called the ileo-cæcal valve), allowing the passage of materials in this direction, but preventing their regurgitation from the large into the small intestine. The mucous membrane of the large intestine has no villi, but is provided with simple glandular follicles, which secrete various excrementitious materials. This portion of the alimentary canal contains also the refuse portions of the food, which, together with the excrementitious matters supplied by its lining membrane, assume a fæcal consistency and appearance from the situation of the ileo-cæcal valve downward, and are finally discharged from the lower extremity of the large intestine.

ALIMENTUS, Lucius Cincius, a Roman historian and jurist, prætor in Sicily 209 B. C. He was for some time a prisoner in the hands of Hannibal, who appears to have treated him with kindness, giving him an account of his march through Gaul and over the Alps. Alimentus wrote a history of Rome which is quoted by Livy. Only fragments of it are preserved. He also wrote an account of his imprisonment among the Carthaginians. He is highly praised by Niebuhr as an accurate investigator. He wrote also on law and antiquities. The fragments of Alimentus still extant are appended to Corte's edition of Sallust.

ALIMONY (Lat. *alimonium*, nourishment), in law, the allowance which a husband, by order of the court, makes to his wife for her maintenance during her separation from him. Of alimony, as of all matters pertaining to the marriage relation, the ecclesiastical courts in England had in former times exclusive cognizance. No such courts were ever established here, and the jurisdiction in respect to alimony is exercised in our states either under express statutes, or as being included in the characteristic powers of courts of chancery or equity. When the jurisdiction is assumed on the latter ground, the court grants this sort of relief in that class of cases in which the ecclesiastical courts of England would have decreed it. Ordinarily the question of alimony in the United States arises in connection with cases of divorce, partial or absolute. It has been the rule of the law until very recent legislation, especially in the United States, modified it, that all the personal property of the wife at her marriage, and all that came to her afterward, and the substantial benefit of her real estate too, vested absolutely in the husband. The law therefore put upon him the correlative duty of maintaining the wife according to his condition in life and pecuniary ability; and it is out of this duty that the wife's right to alimony in case of her lawful separation from her husband also arises. Accordingly, whenever a court adjudges or concedes that the wife may live apart from her husband for his violation of his matrimonial obligations to her, it will also decree that he make her a proper allowance for her sustenance. Observing the conditions of alimony as they were defined by the practice of the English ecclesiastical courts, some of our states, Massachusetts and Pennsylvania for example, have held that, in the absence of express statutes, they have no power to grant alimony in cases of absolute divorce; for as in the English law that kind of divorce was unknown until recently, the spiritual courts gave alimony of course only upon divorces from bed and board, or as we call them partial divorces. But in most of the states the statutes explicitly provide for alimony in all divorces. In general, and for obvious reasons, our courts will not grant permanent alimony to the wife when she is the guilty party, though, as a merciful safeguard against her further debasement, they do sometimes make such provision for her. Nor on other grounds will the courts compel the husband to pay anything when the wife has a separate estate which is withheld by settlement or otherwise from her husband's control, and, considering his means and condition, it yields to the wife as much as she is fairly entitled to.—The provision for the wife may either be made pending a suit for divorce, whether brought by herself or by her husband, in which case it is called alimony *pendente lite* or pending suit; or it may be permanent, that is, for the term of her separation or for her lifetime, and this sort of alimony is ordered upon the passing of the decree of divorce, whether partial or absolute. As to the alimony pending suit, it is quite a matter of course to give it, whichever party brings the action; though when the husband is plaintiff, the court ordinarily requires as a condition precedent a sworn denial of her guilt on the part of the wife, or some other proof of the merits of her case. With this sort of alimony, ordinarily, the court gives a provision for the wife's legal expenses in prosecuting or defending the action. This is only just, for even if the wife is the defendant, she is not yet proved guilty, and to deny her the means of resisting her husband's suit might be to deny her the means of vindicating herself. At all events, if the wife has no means, and the husband has, he must not only support her fairly during the legal proceedings, but also supply her with means for retaining counsel and otherwise paying the legal expenses especially pertaining to the action. The allowance in these respects does not always depend on the fact whether or not the husband has an accumulated property; he may be ordered to pay it out of his daily earnings. And the principle is so reasonable that in a case where the court could not compel a husband who was plaintiff to pay alimony *pendente lite* because he had neither property nor any other resources, it ordered him to suspend his action till he could furnish his wife with the means of defending it. If the husband pay the temporary alimony ordered by the court, he is discharged of all liability for even the wife's necessaries; but he is liable for them if he withholds the allowance, as he is in fact, on general principles, if no alimony has been directed.—The amount of alimony which the court will award *pendente lite* depends on the circumstances of the case and of the parties. It is larger when the wife is plaintiff than when she is defendant, but even in that case the court takes into consideration the fact that she has not yet proved her allegations. It will be less or more according to her condition in life and her needs. It will be less if she has a separate estate, and it may be increased or perhaps reduced from the amount first fixed, as the circumstances of the parties may change; and, as a rule, alimony pending the suit is always much smaller than the permanent provision made after divorce. In England the proportion of the joint income allowed as alimony is ordinarily, and apart from special reasons either way, about one fifth. In New

York the courts have been disposed to allow the woman no more than her actual wants require until the final adjudication upon the merits, when the permanent alimony may be fixed from the beginning of the case, and the amount of temporary alimony paid meantime is deducted from it. Nor as to permanent alimony is there any fixed rule governing the amount of it. In England it seems to be the common practice to award one third of the husband's income. American courts have settled upon no customary proportion, though there are numerous cases reported in which the allowance has been fixed at rates between one fourth and one half. The amount is discretionary, and nothing more definite can be said than that it is the design to give such amount as the wife ought to have, regarding all the circumstances, if the marital relation had not been broken up. By the statutes of most of the states, the wife is entitled, especially in absolute divorces, to recover whatever property she brought to the husband upon the marriage.—The fund out of which alimony is to come is ordinarily the husband's income. The court does not, except when special statutes permit the return of the wife's estate to her, or make similar provisions, turn over to her any specific property. Upon the principle that it is the income which is to respond, it cannot on the one hand avail the husband that he has no invested or permanent property, but his earnings must supply the allowance; and on the other hand, the husband's mere expectations of inheriting property are alike immaterial. The husband's indebtedness should also be taken into account in ascertaining his substantial income and resources.—As the demand or grant of alimony is properly collateral to the principal relief, that of separation or divorce, sought in the action, and as the allowance is not decreed—at least permanent alimony is not—unless the principal relief sought is granted, the application for such maintenance is ordinarily only incidental to the principal suit. It is commonly made upon a special petition, or allegation of faculties, as the proceeding is termed in England, in which the husband's pecuniary resources are alleged; this he meets with an answer or other counter proof, and the allegations on both sides may be passed upon by the court, or referred for more careful examination to one of its officers, as a master in chancery or a referee.—The remedy for enforcing the payment of alimony, when the order of the court regarding it is disobeyed, may be by proceedings against the husband for contempt, or, according to the practice in different states, execution may issue for the amount in arrears, or an action of debt may be brought; and in the federal courts it has been held that a bill in equity will lie. In some states, again, the charge of alimony becomes a lien on the husband's real estate, or the court may compel him to give security for its prompt payment, or in a proper case the husband may even be restrained by injunction from so disposing of his property as to place it beyond the reach of the court.

ALISON, Archibald, a Scottish clergyman and author, born in Edinburgh, Nov. 13, 1757, died there, May 17, 1839. He was educated at the university of Glasgow, and at Balliol college, Oxford, took orders in the church of England, and married the daughter of Dr. John Gregory, professor in the university of Edinburgh. In 1790 he obtained the perpetual curacy of Kenley in Shropshire, and afterward several other preferments in the same county. There he lived happily and tranquilly, with mingled literary and pastoral labors, till 1800, when he removed to Edinburgh for the education of his children, and became senior minister of St. Paul's chapel, in York place, where his eloquence soon attracted the attention of the cultivated society of the metropolis. In 1831 increasing years and failing health obliged him to withdraw from public duties. The first edition of his "Essays on the Nature and Principles of Taste," published in 1790, though highly esteemed within a limited circle of men of culture, had been issued in too expensive a style for general circulation. A second edition, with additions, published in 1811, became popular. In 1814 Mr. Alison published two volumes of sermons, which passed rapidly through five editions, and were republished in America.

ALISON, Sir Archibald, Bart., a British historian, eldest son of the preceding, born at Kenley, Shropshire, Dec. 29, 1792, died near Glasgow, May 23, 1867. He was educated in the schools and university of Edinburgh, was called to the bar in 1814, and availed himself of the first income from his practice to travel in Europe. In 1822 he was appointed deputy advocate general, in 1828 member of the crown council, and in 1834 sheriff of Lanarkshire. His first publication was a work on the "Principles of the Criminal Law of Scotland" (1832), followed the next year by the "Practice of the Criminal Law." These books became standard authorities with the Scottish bar. The first volume of his "History of Europe, from the Commencement of the French Revolution to the Restoration of the Bourbons," appeared in 1839, and the work was completed in 10 volumes in 1842. It ran through numerous editions in England, in 12, 14, and 20 volumes, was reprinted in America, and translated into French and German, and even into Arabic (Malta, 1845) and Hindostanee. The author is said to have conceived the plan of this history in his youth, and to have cherished his purpose during 15 years of travel and study, and 15 more of composition. The author was a stanch tory, and his work is considered deficient both in accuracy and impartiality by the English liberals. Mr. Alison for many years contributed articles to "Blackwood's Magazine," a selection of which was published under the title of "Essays, Political, Historical, and Miscellaneous" (3 vols., 1850). He also wrote "Principles of Population" (2 vols., 1840), combating the theory of Malthus; "England in 1815 and 1845, or a Sufficient or Contracted Currency" (1845); and a "Life of the Duke of Marlborough" (2 vols., 1847). He wrote a continuation of his "History of Europe" to the accession of Louis Napoleon in 1852, of which a second edition was published at Edinburgh in 8 vols. (1863–'5). Mr. Alison was elected rector of Glasgow university in 1851, and received the honorary degree of D. C. L. from the university of Oxford; and soon after the formation of the Derby-Disraeli ministry, June 25, 1852, he was created a baronet.

ALIZARINE, the coloring principle of madder, so called from *alizari*, the name by which that plant is known in the Levant. Madder is the root of several species of *rubia*, among which the *rubia tinctorum* is the most valued for its dyeing properties. This grows in Asia Minor, Holland, Alsace, and in the south of France and of Russia, and has been cultivated to some extent in Delaware and Ohio. A species native to England is the *rubia peregrina*. This belongs to the order *rubiaceæ*, the native members of which, as the galiums, are mostly inconspicuous wild plants. Some of the foreign species are, on the contrary, important plants, such as the cinchona, ipecacuanha, and coffee plants, and these are distinguished for the number and variety of the peculiar principles which they yield, as quinine, cinchonine, caffeine, and alizarine.—In spite of the numerous investigations that have been made of madder, chemists are still in doubt as to the nature of many of its constituents. Some attribute its coloring powers to the presence of at least two substances, alizarine and purpurine; while others say that only one of these produces the true madder colors. Alizarine was discovered and obtained from madder, as a crystalline sublimate, by Robiquet and Colin, in 1831; but little importance was attached to this discovery until Schunck in 1848 showed that all the finest madder colors contain only alizarine combined with bases and fatty acids. The second coloring matter, termed purpurine, was discovered by Persoz. It contributes to the full and fiery red colors in ordinary madder dyeing, but dyes a bad purple, alizarine being essential to the latter. Purpurine disappears during the purifying processes of soaping, &c., being far less stable than alizarine. It is distinguished from alizarine by its solubility in boiling alum liquor. These two coloring principles may likewise be easily distinguished by the spectrum, alizarine producing a set of dark absorption bands, quite different from those of purpurine, which again vary according to the nature of the solvent. Alizarine can be obtained in yellow needle-shaped crystals by simple sublimation from the dried madder; but this coloring matter is, singularly enough, not contained ready formed in the fresh madder root, but is the product of a peculiar decomposition. A crystalline glucoside, termed rubianic acid (Schunck), is contained in the root, and it is this which splits up simply into alizarine and glucose. This acid crystallizes in fine yellow needles, and gives a definite and crystalline potash salt, from which it was shown to contain 26 atoms of carbon in the molecule. Hence, as no other product but glucose is formed, it follows that alizarine must contain $C_{26} - C_{12} = C_{14}$. The formation of alizarine in extracts of madder root is effected by fermentation peculiar to the plant, and called erythrozine. It is *sui generis*, since no other ferment produces the same effect. When mixed with a solution of rubian or rubianic acid, at the ordinary temperature, the latter is rapidly decomposed as with acids. This is what takes place in making *fleur de garance*. Dyers raise the temperature of their madder baths gradually up to the boiling point, because the application of a high temperature destroys the ferment. When the temperature is gradually raised, the ferment acts upon the glucoside, and produces alizarine. According to Schunck, the origin of purpurine, and its relation to alizarine, are still (1870) involved in obscurity. The formula assigned to alizarine by some chemists is $C_{10}H_6O_3+2H_2O$; while Gräbe and Liebermann prefer $C_{14}H_8O_4 +H_2O$.—**Artificial Alizarine.** In studying the transformations of alizarine under the action of chemical reagents, Messrs. Gräbe and Liebermann in 1869 were led to connect it with anthracene, one of the coal-tar series of bodies (see ANTHRACENE), and to devise a mode of forming it artificially. This is justly regarded as one of the most important as well as beneficent discoveries of the age: important as affording a new source for a valuable dye, and beneficent as restoring to agriculture large tracts of land now devoted to the culture of the madder root. The method employed by Gräbe and Liebermann in the artificial production of alizarine is as follows: One part of anthracene is heated with four parts of sulphuric acid, of sp. gr. 1·845, for three or four hours, to a temperature of 212° C., and then for about an hour at 300° C. The mixture is allowed to cool, and to it is added water equal to three times the weight of the anthracene employed, and manganese equal to four times that weight. The whole is boiled for three hours, and milk of lime added, which gives rise to a deposit consisting of the excess of lime and manganese used, and protoxide of manganese, while there remains in solution a double sulphate of anthraquinone and lime. The solution is now acted upon by carbonate of soda in excess; carbonate of lime separates, and the salt of soda thus produced is evaporated to dryness. The solid mass is then mixed with two or three parts of caustic soda and a little water, and heated under pressure in suitable vessels, at a high temperature, whereby the anthraquinone is further oxidized and converted into alizarine. The alkaline mass, on cooling, is dissolved in water and sulphuric or acetic acid added in slight excess, when an orange-yellow flocculent substance precipitates, which, when perfectly washed and dried, is artificial alizarine. The artificial product appears to be entirely identical with the coloring matter obtained from the madder root. Both the natural and the artificial products crystallize in needles and dissolve in caustic alkalies, forming violet solutions of the same tint and possessing precisely the same tinctorial value. Applied to mordanted fabrics, they produce exactly the same colors, and they resist equally well the action of light. If an adequate supply of anthracene can be obtained, the artificial production of alizarine bids fair to become an established industry of great importance.

ALKALI (Arabic, *al-qali*, the ashes of the plant glasswort, yielding soda), the general name of a class of substances, such as cæsia, rubidia, potash, soda, lithia, and ammonia, whose distinguishing peculiarities are solubility in alcohol and water, uniting with oils and fats to form soap, neutralizing and forming salts with acids, reddening several vegetable yellows, and changing reddened litmus to blue. These properties are the reverse of those of acids, and the two classes are regarded as antagonistic to each other. Some other substances, as lime, baryta, strontia, and magnesia, possessing some of the qualities of the alkalies as neutralizing acids, and changing the vegetable colors, are called alkaline earths. Pure anhydrous alkalies are exceedingly caustic, destroying vegetable and animal tissues. They abstract moisture rapidly on exposure to the air. Combined with carbonic acid and water, forming carbonates, they are used in medicine as diuretics and for correcting acidity, as well as for other effects. The alkalies and the earths also were until the present century regarded as simple substances. Lavoisier first suggested that they were metallic oxides. Sir Humphry Davy proved this in 1807, by separating the metals, to which he gave the names potassium, sodium, barium, strontium, and calcium, the last the metallic base of lime. The discovery of these metals led to that of pure potash and soda. The alkalies were known before only in the state of hydrates, though incorrectly regarded as anhydrous.

ALKALIMETRY, the process employed to estimate the quantity of alkali present in any mixture. Its principle consists in exactly neutralizing a certain weight of the alkali, and knowing the quantity of acid of a given strength which is required to effect this. The alkaline substance, carefully weighed, is dissolved in warm water, placed in an alkalimeter, which is usually a graduated glass tube, and diluted sulphuric acid cautiously and slowly added till the solution is made neutral. This is known by the use of little bits of test paper in the liquid, which, by their change of color, indicate the slightest acid or alkaline reaction. The process may be reversed to test the strength of acids, and is then called acidimetry.

ALKALOID, vegetable alkali, a name given to vegetable extracts possessing the property of uniting with acids to form salts in the same manner as ammonia. The first alkaloid was discovered by Sertürner in 1804 in opium; but little importance was attached to the announcement, and it was not till 1817 that the real value of morphine was demonstrated and the existence of vegetable alkalies fully shown. Since that time the list of alkaloids has rapidly increased, until at the present time (1872) they number more than 100. There are two classes, volatile liquids and permanent solids. The former contain simply carbon, hydrogen, and nitrogen, and only three of them are known, coniine, nicotine, and sparteine. The solid and most numerous alkaloids contain carbon, hydrogen, nitrogen, and oxygen. The organic bases are colorless and generally crystalline. They are insoluble or slightly soluble in water, the best solvent being alcohol. Ether dissolves some of them; chloroform and the hydrocarbons are also good solvents. They generally possess powerful medicinal properties. Numerous artificial alkaloids have been formed, the most important of which is aniline. The natural base coniine has also been made artificially. Some of the best known of the vegetable alkaloids are nicotine, quinia, morphia, strychnia, brucia, aconitina, atropia, and caffeine.

ALKANA. See HENNA.

ALKANET, the commercial name of two different plants. True alkanet consists of the roots and leaves of the *Lawsonia inermis*, which grows wild in the Levant. The leaves pulverized and made into a paste yield a yellow dye. The root, which contains a red pigment, is used as a cosmetic. False alkanet (*orcanette*, *radix alcannæ spuriæ*) is the root of *anchusa tinctoria*, which grows in France, Spain, Italy, Hungary, and Greece. It is inodorous, has a faint, somewhat astringent taste, and colors the saliva. It is used in dyeing goods previously prepared with alum mordants for violet, and iron mordants for gray. The mordanted linen or cotton goods are dipped in an alcoholic extract of the root. It is also used for dyeing silk, but not wool. The coloring matter is called anchusine. The violet and gray colors are brilliant.

ALKINDI, or **Alchindus,** an Arabian physician and philosopher, born in Bassorah at the end of the 8th century, died in the middle of the 9th. Some, however, place his life two or three centuries later. He wrote more than 200 different treatises on logic, music, geometry, arithmetic, astronomy, medicine, &c. His treatise known under the Latin title *De Theoria Magicarum Artium* has secured for him the fame of a magician. Various other works of his were translated into Latin during the middle ages, and published at Paris, Strasburg, and Venice. His theories are distinguished by great ingenuity, so much so that Cardan ranked him among the twelve subtle spirits of the world.

ALKMAAR, a well built and strongly fortified town of the Netherlands, in North Holland, on the Helder ship canal, about 18 m. N. by W. of Amsterdam; pop. in 1867, 11,609. Its environs are laid out in beautiful gardens and fine meadows, and broad canals intersect its streets, the banks of which are planted with trees. A court of first resort and a tribunal of commerce sit in Alkmaar, and the town is well supplied with educational and scientific institutions. There is a large export trade in cheese and butter, and a considerable trade in cattle and corn. The manufactures consist of sail cloth, parchment, salt, soap, vinegar, leather, and earthenware. Alkmaar successfully stood a siege of ten years by the Spaniards, from 1573 to 1583; and in the expedition of 1799 the British and Russians, under the duke of York, halted here, before the conclusion by the latter of his inglorious capitulation with the French.

ALKMAAR, Heinrich von, a poet of the 15th century, a native of Alkmaar, celebrated principally in connection with his supposed authorship of the famous poem *Reineke Vos* or *Reineke Fuchs;* but, from Alkmaar's own statements in his preface, it seems probable that he only compiled the poem.

ALKORAN. See Koran.

ALLAH (Arab. *al*, the, and *Illah*, God), the Mohammedan name of the Supreme Being. The unity of the Deity is the great postulate of the Mohammedan creed. His attributes are thus summed up by the Koran: "There is no God but God. This only true, great, and most high God has his being through himself; is everlasting; is not begotten and begetteth not; is all-sufficient in himself; fills the universe with his infinity; is the centre in which all things unite, as well the hidden as the manifest; is Lord of the world of bodies and spirits, creator and ruler, almighty, all-wise, all-loving, merciful; and his decrees are unchangeable." Mohammedans repeat a rosary of the 99 epithets of the Supreme Being, closing it with the great, all-including name of Allah. *Allah akbar* (God is great) is a battle cry of the Moslem, while *Bism-Illah* or *Bism-Allah* (in the name of God) is the grace before meat of the pious and the invocation at the commencement of every literary performance.

ALLAHABAD. I. A division of the Northwestern Provinces of British India, bounded N. by Agra and Oude, E. by Behar, S. by Gundwana, and W. by Malwah; area, 11,826 sq. m.; pop. about 3,800,000. It is one of the richest provinces of Hindostan. **II.** A district of the preceding division, between lat. 24° 49′ and 25° 44′ N., and lon. 81° 14′ and 82° 26′ E.; area, 2,788 sq. m.; pop. about 1,400,000. A part of the district is included in the great plain of the Doab, and the surface generally is nearly level. It is abundantly watered by the Ganges, the Jumna, and some artificial watercourses, produces timber, maize, cotton, flax, indigo, and sugar, and exports salt. **III.** The chief town of the district and province, and since 1862 capital of the Northwestern Provinces, situated at the confluence of the Ganges and Jumna, and on the East Indian railway, lat. 25° 26′ N., lon. 81° 55′ E., 75 m. N. W. of Benares; pop. about 65,000, including suburbs. The Hindoos, who call the town Prayaga, regard it as the holiest of all places, and immense numbers of pilgrims visit it annually to bathe at the junction of the two rivers. It was also regarded by the Mohammedans as so sacred that, on coming into possession of it, they named it "God's place" (*Allah abad*). It contains some interesting shrines and ruins, and an ancient castle, converted into a fort and great military depot for Upper India. The native town is inconsiderable, but the European quarter is well built, and the British government since the sepoy rebellion has planned extensive improvements, which will render Allahabad a great military and commercial post. Some have identified the city with the Palibothra of Greek and Roman geographers. It was fortified by Akbar, and on the dismemberment of the empire of Delhi was seized in 1753 by the vizier of Oude, from whom it was taken by the British in 1765; it was afterward transferred to the nawaub of Oude, and finally ceded to the East India company in 1801. It was then in a very ruinous condition. A sepoy regiment mutinied here June 6, 1857, and killed several of their officers. The rest of the Europeans defended themselves in the fort until relieved by Col. Neill, but the town was nearly destroyed.

ALLAMAKEE, a county forming the N. E. extremity of Iowa, bordering on Minnesota, and separated from Wisconsin by the Mississippi river; area, 667 sq. m.; pop. in 1870, 17,868. It is intersected in the N. by the Upper Iowa, and in the S. by the Yellow river. The soil is productive, and the surface undulating woodland and prairie. The productions in 1870 were 675,448 bushels of wheat, 331,035 of corn, 2,899 of oats, 25,474 of barley, 73,512 of potatoes, and 18,873 tons of hay. Capital, Lansing.

ALLAMAND, Jean Nicolas Sébastien, a naturalist, born in Lausanne in 1718, died in Leyden, March 2, 1787. He was professor of philosophy and natural history at the university of Leyden, member of the London royal society, and of the Haarlem academy of sciences. The Dutch sailors collected for him, in their expeditions into distant countries, specimens of plants, animals, and fossils, which he placed in the botanic garden and museum of the university, which were under his care. He devoted much time to the study of electricity, and was the first to explain the phenomena of the Leyden jar. The shrub *Allamanda*, a native of South America, is called after him. He was the literary executor of 'sGravesande and Prosper Marchand, and, besides editing their unpublished works, translated and edited many English books.

ALLAN, David, a Scottish painter and engraver, born at Alloa, in Clackmannanshire, Feb. 13, 1744, died in Edinburgh, Aug. 6, 1796.

In 1755 he entered as an apprentice the art academy of Robert Foulis in Glasgow, and in 1764 went to Rome, where in 1773 he obtained from the academy of St. Luke the gold medal for the best historical drawing. His earliest humorous productions were four sketches of the carnival at Rome. He settled in Edinburgh; and in 1786, after the death of Runciman, he was appointed master of the academy of arts. About the same time he commenced 12 illustrations of Allan Ramsay's "Gentle Shepherd," which he subsequently engraved in aquatint. He also made some designs from the lyrics of Burns.

ALLAN, Sir **William,** a Scottish historical painter, born in Edinburgh in 1782, died Feb. 22, 1850. Failing to obtain patronage in London, he went to Russia, where he spent ten years, and made visits to the Crimea, Circassia, and Turkey. In 1814 he returned to Edinburgh, where he became intimate with Sir Walter Scott, through whose influence his picture of the "Circassian Captives" was purchased by subscription for 1,000 guineas. In 1841 he once more went to St. Petersburg, where he executed for the emperor a painting of "Peter the Great teaching his Subjects the Art of Shipbuilding," now in the winter palace. In 1826 he was made an associate of the royal academy at London, and in 1835 an academician. He was president of the royal Scottish academy from 1838 till his death.

ALLAN-KARDEC, Hippolyte Léon Dénizard, a French spiritualist, born in Lyons, Oct. 3, 1803, died April 1, 1869. He established in 1858 a periodical review on spiritualism (*Revue spirite*), and the *société parisienne des études spirites*. His principal works are: *Le livre des esprits* (2 ed., 1860); *Le livre des médiums;* and *L'imitation de l'Évangile selon le spiritualisme* (1864).

ALLARD, Jean François, a French soldier, born at St. Tropez, Provence, in 1785, died in Peshawer, Jan. 23, 1839. In 1815 he served on the staff of Marshal Brune, after whose murder he went to Egypt, and thence to Persia, where he entered the service of Abbas Mirza. In 1820 he went to Lahore, and took service under Runjeet Singh, by whom he was finally made commander-in-chief of his army. He organized and disciplined the troops after the French model, and gained many victories. In 1835 he revisited France, accompanied by his family, and was received with distinguished honors, Louis Philippe appointing him chargé d'affaires in Lahore.

ALLARDICE, Robert Barclay. See BARCLAY.

ALLEGAN, a W. S. W. county of Michigan, on Lake Michigan; area, 840 sq. m.; pop. in 1870, 32,105. The Kalamazoo river (navigable by small steamboats) intersects it, and it is drained by the Black and Babbit rivers. The soil is a deep black alluvium on the river margins, and in some other parts sand and clay predominate; the surface is undulating and mostly covered with forests. In the S. W. part is a quarry of good limestone. Several lines of railroad traverse the county. The productions in 1870 were 338,248 bushels of wheat, 376,974 of corn, 205,219 of oats, 20,973 of barley, 267,795 of potatoes, 129,223 lbs. of wool, 476,065 of butter, 127,336 of maple sugar, and 27,458 tons of hay. There were 167 school houses. The capital, Allegan, is built on both sides of Kalamazoo river, 145 m. W. by N. of Detroit, and has a considerable trade in lumber.

ALLEGANY. **I.** A W. S. W. county of New York, bordering on Pennsylvania; area, 1,045 sq. m.; pop. in 1870, 40,814. The Genesee river and its tributaries furnish motive power for numerous mills. On each side of the Genesee valley the country rises until it becomes table land in the E. and W. parts. The productions in 1870 were 195,721 bushels of wheat, 800,600 of oats, 16,434 of rye, 185,850 of corn, 96,554 of buckwheat, 29,558 of barley, 384,687 of potatoes, 492,568 lbs. of maple sugar, 410,168 of wool, 1,908,721 of butter, 220,880 of cheese, and 134,797 tons of hay. There are numerous saw and grist mills, tanneries, &c. Bog iron ore and limestone are obtained. The New York and Erie railroad and the Genesee canal pass through the county. Capital, Belmont. **II.** A W. county of Maryland, bordering on Virginia and Pennsylvania, bounded by the Potomac and its north branch; area, 800 sq. m.; pop. in 1870, 38,536, of whom 1,166 were colored. The Youghiogheny river intersects its W. part, and it is drained by several creeks. The main Alleghany mountains and several smaller ridges traverse it, and its surface is rocky and broken. Limestone, sandstone, iron ore, and coal abound, the last being extensively mined at Cumberland. The glades or valleys in the mountains furnish the celebrated glades butter and mutton. The Baltimore and Ohio and Pittsburgh and Connellsville railroads and the Chesapeake and Ohio canal pass through the county. The productions in 1870 were 70,404 bushels of wheat, 45,090 of rye, 116,062 of corn, 206,589 of oats, 47,935 lbs. of wool, 387,639 of butter, and 70,454 of maple sugar. There are numerous manufacturing establishments. Capital, Cumberland.

ALLEGHANY. **I.** A W. county of Virginia, bordering on West Virginia, and bounded N. W. by the main chain of the Alleghanies and S. E. by Middle mountain; area, 500 sq. m.; pop. in 1870, 3,674, of whom 579 were colored. Jackson's river unites with Cow Pasture river on the E. border to form the James. The passage of Jackson's river through one of the mountains affords fine scenery. Peters and the Warm Spring mountains extend through the centre of the county. Iron ore is found, and the Red Sweet Springs have some celebrity. The Chesapeake and Ohio railroad passes through Covington, which is beautifully situated on Jackson's river. The productions in 1870 were 24,843 bushels of wheat, 50,695 of corn, 31,991 of oats, 25,747 lbs. of tobacco, and 40,690 of butter. Capital, Covington. **II.** A N. W. county of North Carolina, bordering on Virginia, bounded W. by New river, a branch of the Kanawha, and E. and S. by the Blue Ridge mountains; area, 300 sq. m.; pop. in 1870, 3,691. There are mines of copper. The productions in 1870 were 7,988 bushels of wheat, 43,369 of corn, and 21,496 of oats. Capital, Gap Civil.

ALLEGHANY COLLEGE. See MEADVILLE.

ALLEGHANY MOUNTAINS. See APPALACHIAN MOUNTAINS.

ALLEGHANY RIVER rises in Potter county, N. Pennsylvania, flows circuitously westward through New York, returns to Pennsylvania, and after a southerly course unites at Pittsburgh with the Monongahela river to form the Ohio. It flows through a hilly country, abounding in pine forests and coal. The river is navigable for small steamboats to Olean, N. Y., 240 m. from its mouth and about 45 m. from its source, and to Waterford, Pa., on French creek, its principal tributary, 14 m. from Lake Erie. Its chief tributary from the east is the Conemaugh. The principal towns along its course are Warren, Kittanning, Franklin, and Oil City. The Alleghany separates Pittsburgh from Allegheny City.

ALLEGHENY, a S. W. county of Pennsylvania; area, 750 sq. m.; pop. in 1870, 262,204. Near the centre of the county the Ohio is formed by the confluence of the Alleghany and Monongahela rivers. The Youghiogheny and several creeks also drain it. Near the rivers the surface is broken into ravines; most of the upland is hilly and very picturesque. Nearly all of the county is arable. The productions in 1870 were 325,331 bushels of wheat, 674,916 of corn, 1,111,269 of oats, 78,372 of rye, 69,946 of barley, 769,144 of potatoes, 308,475 lbs. of wool, 1,223,744 of butter, and 64,730 tons of hay. Bituminous coal is found in the county, and iron, glass, wool, &c., are extensively manufactured. The valuation of personal property in 1870 was $12,367,611. Allegheny is the second county in importance in the state. Capital, Pittsburgh.

ALLEGHENY CITY, a manufacturing city of Allegheny county, Pa., opposite Pittsburgh, on the W. side of the Alleghany river, at its junction with the Monongahela; pop. in 1860, 28,702; in 1870, 53,180. The city contains many elegant residences of persons doing business in Pittsburgh. It has one weekly newspaper, and one semi-monthly and one monthly periodical. The Western theological seminary of the Presbyterian church was established here in 1827. Before the union it was under the control of the Old School Presbyterians. In 1868 there were 5 professors and 70 students, 935 graduates, and the endowment amounted to $184,800. The theological seminary of the United Presbyterian church, established in 1826, and the Allegheny theological institute, organized in 1840 by the synod of the Reformed Presbyterian church, are also situated here. In 1868 the former had 3 professors, 36 students, 426 graduates, and 2,000 volumes in the library. The western penitentiary, an immense building in the ancient Norman style, situated on the "common" of Allegheny City, was completed in 1827 at a cost of $183,000. In 1868 it had 463 inmates, employed in weaving, shoemaking, and the manufacture of cigars; earnings, $27,013. The city contains 12 schools, 2 national banks, 10 savings banks, 1 real estate bank, and 1 trust company; 4 rolling mills, employing 1,155 hands; 5 cotton mills, with 1,050 hands; 11 ale and beer breweries, averaging 20 men each; 6 founderies and machine shops, averaging 30 men each; 1 blast furnace, with 70 men; and 1 steel factory, with 250 hands. The Pittsburgh locomotive works employ 380 hands and complete one locomotive a week. There are 45 churches, of which 16 are Presbyterian, 9 Catholic, 8 Methodist, 3 Baptist, 3 Lutheran, 2 Episcopal, and 1 each Congregational, Disciples', and Reformed. The charitable institutions are the home for the friendless, the widows' home association, the house of industry, and the orphan asylum. There is a soldiers' monument which cost $37,000. The city park contains an area of 100 acres. The assessed value of property in 1871 was $8,434,636.

ALLEGIANCE (Lat. *alligare*, to bind to), the subject's duty of obedience to the sovereign under whose protection he is. Allegiance is correlative with protection, and the duty of allegiance is in return for and in consideration of the fact of protection. Therefore, when the sovereign can no longer protect the subject, his allegiance ceases; and on this principle the duty is discharged by conquest or by cession of the sovereign's territory by treaty. Natural allegiance arises from the fact of birth within the territorial domain and actual protection by the sovereign. But actual allegiance is due even by an alien to the sovereign of the state in which he is; though, by comity of nations, there is an exception to this rule in favor of foreign sovereigns and ambassadors and their suites, and of the officers and crews of foreign war ships, and of foreign armies when they are permitted to pass through the state. As allegiance is the highest of the citizen's obligations, so the violation of it is the highest of crimes, or treason. The principle that allegiance is due to the actual sovereign has been carried so far as to make acts treasons though they were done against a usurper; and Blackstone says that on this ground, after Edward IV. recovered the crown, treasons committed against Henry VI. were capitally punished, though Henry had been declared a usurper by parliament. On the other hand, but on the same principle at common law, and until a statute was passed for their naturalization, the children of English subjects born abroad, that is, out of the king's domain and protection, were aliens. But the most important quality attached by the common law to the doctrine of allegiance was that it was indissoluble. The principle was shortly expressed in the familiar

Latin maxim, *Nemo potest exuere patriam*, "No one can abjure his country," or renounce the fealty which he owes to his sovereign. The maxim is as old as English jurisprudence, and until the most recent period the rule has been maintained in England to its fullest extent. It has nowhere else been asserted, in modern times at least, with the same rigor with which it was enforced there; and even while it stood the acknowledged rule of the law of England, it was condemned by many of its soundest jurists. One of them, Twiss, has very lately said of it that it found no countenance in the law of nations, but was on the contrary in direct conflict with incontestable principles of that system. Observing the more liberal tone of modern public law upon this subject, it is worth notice that it is now asserting only the doctrine which was maintained by the law of Rome in its best period. In his argument for Balbus Cicero declared it to be even the firmest foundation of Roman liberty that the citizen might retain or renounce his allegiance at his pleasure. But the English common law asserted that allegiance intrinsic and absolute arose from the mere fact of birth within the sovereign's dominion and protection; that it could not be cancelled or forfeited by any change of time, place, or circumstances; that the subject could not abjure it or renounce it by abandoning the realm, nor by swearing loyalty to another state; nor could it be released in any way without the concurrence of the supreme legislative power. Coke expressed the rigor of the rule as it was held in England in his time, and indeed for more than two centuries afterward, when he said that "all subjects are equally bound to their allegiance as if they had taken the oath of it, because it is written by the finger of the law in their hearts." As has just been said, however, this supreme duty might be released by the consent of the sovereign. Such an assent was given, for example, in the case of the United States, when by treaty our independence was recognized by Great Britain; and after that it was several times decided in England that persons, though born here British subjects, who adhered to the new state, ceased to be subjects of the crown and became aliens. But though steadily asserting the rule that allegiance was indissoluble, England has nevertheless practically conceded its invalidity by admitting and naturalizing foreigners into her citizenship, just as all other countries have done.—In modern times at least, no other considerable European state has enforced the theory of the common law, or at least not with the severity with which it was enforced in England. The French code declares expressly that the quality of a Frenchman is lost by naturalization in a foreign country, and France, Spain, and most of the German states have enacted laws regulating the naturalization of foreigners. The great European authorities in public law, Grotius, Pufendorf, Vattel, and others, concede in general terms the right of expatriation, qualifying it only when it is restrained by law, or when the citizen owes to his native state some already assumed but not yet discharged obligation; if, for example, he has violated the law and owes the penalty, or is invested with some public trust, or war threatens and his sovereign needs his aid; and these have been the chief modifications of the right to renounce allegiance which have been discussed in our own diplomatic correspondence upon this subject with European states. When once naturalization is admitted to be competent and right, the right of expatriation and of renunciation of the former allegiance should seem to be implied as a necessary corollary. Naturalization means the complete adoption of a foreigner and the investing him with the actual citizenship of his adopted country. In practice it compels, as a precedent condition, his entire renunciation of his former allegiance, and the assumption by solemn oath of an exclusive fidelity to the new sovereign; and, with one or two modifications only, it gives him the same rights which he would have had if he had been born within his dominion and protection. The status which he thus receives is clearly inconsistent with any allegiance to the country of his birth. Allegiance cannot be divided, and if his original allegiance has not been utterly cancelled, then the naturalization is an empty form, and the adopted citizen has not the right to protection and citizenship which the new sovereign pretends to guarantee to him. These considerations have been brought forward in most of the cases which have arisen from time to time in the United States. In the earlier cases, however, though the courts inclined to give them their just weight, they repeatedly evaded direct decision of the question. From an historical review of all the cases which had arisen down to his time, Chancellor Kent declared the prevailing spirit of the decisions to be that, in the absence of any legislation sanctioning the abjuration of allegiance, the rule of the common law remained unaltered. But in one instance at least, as early as 1812, our government assumed a position on this question quite as advanced as it has ever taken in the cases which have arisen since that time. During the war with England then existing, the prince regent announced that every native-born Briton, taken prisoner while fighting in the American army, should be executed for treason to his lawful sovereign. Mr. Madison announced in return, that if any naturalized citizen of this country were put to death on the pretence that he was a British subject, the United States would put to death two English prisoners in retaliation. There was no further discussion on the subject, and no occasion for any. Still later, and especially within the last twenty years, cases have occurred in which foreigners naturalized here were upon their return to their native states compelled to render military service there, or were otherwise forced to assume the duties of subjects of their states of birth, and they invoked the protection of the United States by virtue of their status as American citizens. In 1857, in the case of Ernst, a subject of Hanover, naturalized here, who on his return was forced into the Hanoverian army, Attorney General Black gave to the president a very clear and convincing opinion, in which he advised him that Ernst was an American citizen; that by the public law of the world we have the undoubted right to naturalize a foreigner, whether his natural sovereign consents to his emigration or not; and that Hanover could not justify Ernst's arrest, even by showing that he emigrated contrary to the laws of that country, unless it could be proved that the original right of expatriation depended on the consent of the natural sovereign; and as to the last proposition, he added that he was sure that it could not be established. In a case in the same year, that of Amther, Mr. Black's opinion was to the same effect on a reversed state of facts. Amther, a Bavarian subject, after being naturalized here, returned to Bavaria and sought to recover his original status as a citizen of that country. The authorities there doubted whether he could throw off his allegiance to this country, but the attorney general of the United States was of the clear opinion that he could; that by our law any citizen, native or naturalized, might sever his political connection with this government at his pleasure, provided it was for a purpose and at a time which were not injurious to our interests. He was of the opinion, therefore, that Amther might be reinstated as a citizen of Bavaria, and that, as a condition to such restitution of his citizenship, the Bavarian government was at liberty to compel him to abjure his allegiance to the United States in any form that its laws required. Doctrines quite as emphatic were pronounced by Mr. Marcy, secretary of state in 1853, in the famous case of Koszta. In a letter to the American minister to Prussia in 1859, concerning cases then in hand, Mr. Cass declared that the right of expatriation could not at this moment be doubted or denied in this country, and that the doctrine of perpetual allegiance was a relic of barbarism which was fast disappearing from Christendom. In 1866 Attorney General Stanbery declined to discuss the general question of the right of expatriation under our law, on the ground that the practice of the United States had long since rendered that question a mere abstraction. It should be observed, however, that our government, in its dealings with other nations on this subject, has not claimed that the right to renounce allegiance is absolute under all circumstances. It has been willing to concede that our naturalization did not give full rights of American citizenship to aliens whose removal from their native country bore the character of an escape or flight from civil or political obligations already fixed upon them; so that, while it would not recognize any validity in the general right to claim military service, for example, the actual performance of which had not been demanded when the foreign subject left his country, yet it would concede that there was a just force in the claim of the foreign state, when the subject had been already conscripted into the army, and had deserted from it, or had otherwise run away from actually existing obligations. The whole subject has been finally closed, so far as the law of the United States about it is concerned, by a very explicit and vigorous statute passed in July, 1868. Its preamble recites that the right of expatriation is a natural and inherent right of all people, indispensable to the enjoyment of the rights of life, liberty, and the pursuit of happiness; that in the recognition of this principle, this government has freely received emigrants from all nations and invested them with the right of citizenship; that it is necessary for the maintenance of public peace that the claim of foreign allegiance as to such adopted citizens should be promptly and finally disavowed; and it is therefore enacted that any declaration, opinion, order, or decision of any officer of this government which denies, impairs, restricts, or questions the right of expatriation, is inconsistent with the fundamental principles of the government. The statute further enacts that all naturalized citizens of the United States, while in foreign states, are entitled to and shall receive from this government the same protection of person and property that is accorded to native-born citizens in like circumstances. At last, in 1870, Great Britain by the naturalization act of that year (May 12) revised all her own laws upon alienage, expatriation, and naturalization, and for the first time in her history recognized the right of her subjects to renounce their allegiance to the crown. (See NATURALIZATION.)

ALLEGRI, Antonio. See CORREGGIO.

ALLEGRI, Gregorio, an Italian ecclesiastic and composer of church music, born in Rome about 1580, died there in February, 1652. He was the pupil of Nanini, and on terms of intimacy with Palestrina. His voice was not remarkable, but he was a perfect master of harmony, and was made one of the singers in the pope's chapel in 1629. The famous *Miserere*, performed yearly on Wednesday and Friday of Passion Week, in the papal chapel, is his composition.

ALLEINE, or Allein. I. Joseph, an English nonconformist minister and author, born at Devizes in 1633, died in 1668. He received his education at Oxford, and was a man of extensive literary acquirements. Though ejected from his curacy and imprisoned for nonconformity, he yet preserved his reverence for the ecclesiastical authorities, and his loyalty to the king. His principal work, "An Alarm to Unconverted Sinners," has passed through numerous editions. **II. Richard,** an English nonconforming clergyman, born at Ditchet, Somersetshire, in 1611, died in 1681. He was educated at Oxford, and became rector of Batcombe in Somersetshire. He was a rigid puritan, and assisted the commissioners appointed by parliament to purify the church of "scandalous ministers." He was deprived of his rectory after the restoration as a nonconformist, but continued to preach in a private house. Although often censured for so doing, his virtues shielded him from any severity on the part of the authorities.

ALLEMAND, Zacharie Jacques Théodore, count, a French vice admiral, born at Port Louis (island of Mauritius) in 1762, died at Toulon, March 2, 1826. He entered the navy at the age of 12, was one of the first chevaliers of the legion of honor, and was soon after its formation raised to the rank of officer. In various cruises he inflicted immense losses upon English commerce. In 1809 he commanded the squadrons of Brest, Toulon, and Rochefort, in the capacity of vice admiral. The fleet was anchored in the Basque roads (between the islands of Aix and Oléron), when on April 11 Lord Cochrane attacked it with 50 fire ships and several infernal machines invented by Col. Congreve. Allemand saved all but four of his vessels, and the success of the English was very slight, compared to the immense cost of the expedition.

ALLEN. I. A S. county of Kentucky, bordering on Tennessee, bounded N. E. by Big Barren river, and intersected by Trammel's creek; area, 300 sq. m.; pop. in 1870, 10,296, of whom 1,104 were colored. There are several caves and salt springs in the county. The surface is level and the soil moderately fertile. The productions in 1870 were 55,844 bushels of wheat, 390,883 of corn, 96,647 of oats, 747,489 lbs. of tobacco, 133,487 of butter, and 23,635 gallons of sorghum molasses. Capital, Scottsville. **II.** A W. N. W. county of Ohio, intersected by the Auglaize and Ottawa rivers and Riley and Sugar creeks; area, 405 sq. m.; pop. in 1870, 23,623. It has a fertile soil, with a surface generally level and abounding in hardwood timber. The productions in 1870 were 815,164 bushels of wheat, 21,671 of rye, 209,269 of oats, 374,017 of corn, 92,035 lbs. of flax, 125,897 of wool, 466,482 of butter, and 21,173 tons of hay. Several railroads and the Miami canal pass through it. Capital, Lima. **III.** An E. N. E. county of Indiana, on the Ohio line; area, 638 sq. m.; pop. in 1870, 43,494. It is nearly level, with a fruitful soil, and well watered by the St. Joseph and St. Mary rivers, which unite at Fort Wayne and form the Maumee river. It is well wooded with oak, hickory, beech, maple, and other trees. The Wabash and Erie canal passes through the county, which is also intersected by numerous lines of railroad. The productions in 1870 were 432,752 bushels of wheat, 273,344 of corn, 212,944 of oats, 100,930 of potatoes, 106,778 lbs. of wool, 543,322 of butter, and 28,377 tons of hay. Capital, Fort Wayne. **IV.** A new county in S. E. Kansas; area, 504 sq. m.; pop. in 1870, 7,022. The Neosho river flows through the W. portion of the county. Coal is found, and stock-raising is extensively pursued. The county has railroad communication with Junction City on the Kansas Pacific road, and also with Lawrence. The productions in 1870 were 27,734 bushels of wheat, 187,225 of corn, 115,708 of oats, 23,338 of potatoes, and 90,588 lbs. of butter. There were 29 schools, 3 newspapers, and 12 manufacturing establishments. Capital, Iola.

ALLEN, Bog of. See Bog.

ALLEN, Ethan, an American revolutionary partisan, born in Connecticut in 1739, died in Burlington, Vt., Feb. 13, 1789. About 1763 he settled, with four younger brothers, in the township of Bennington, Vt. Previous to the revolution there existed a dispute between the colonies of New York and New Hampshire relative to their boundaries, and the debatable land included the whole of the present state of Vermont, then called the New Hampshire grants. Ethan Allen first became conspicuous in the controversy which grew out of the attempt to enforce New York law. Actions of ejectment being brought against those who held land under grants from New Hampshire, Allen was selected in 1770 as agent to represent the settlers in the litigation at Albany. The decision was adverse to them, and they resolved to resist. They adopted Allen's own phrase, "The gods of the valleys are not the gods of the hills." The New York authorities were everywhere set at defiance. Allen was made colonel of an armed force which not only protected the New Hampshire grantees, but removed the New York settlers. Governor Tryon of New York proclaimed a reward of £150 for his arrest. This state of affairs remained unaltered till the revolution, New York maintaining her hostile attitude, and the Vermonters the possession of their farms. In 1775, when war with the mother country had become inevitable, the occupation of Ticonderoga was determined on, and the task was confided to Allen, who set out at once at the head of his "Green Mountain Boys," reaching Castleton May 7, 1775. A party was also detached under Capt. Herrick toward Skenesborough, and another under Capt. Douglass to Panton in the vicinity of Crown Point. On the morning of May 10 Allen, who had previously been joined by Arnold, surprised Ticonderoga, summoning Capt. Delaplace, who commanded the post, to surrender "in the name of the great Jehovah and the continental congress." By this *coup de main*, 2 officers, 48 rank and file, 120 pieces of artillery, and a large quantity of small arms, were captured, and the command of the Green mountains was wrested from the English. Only 80 Americans were present at the capture. The other enterprises were equally successful, Skenesborough and Crown Point being also captured. A dispute ensued between Arnold and Allen relative to the command, which the latter maintained until he was relieved by the arrival of the Connecticut regiment, commanded by Col. Hinman, to whom he delivered his conquests. Allen immediately proposed to the authorities of New York an invasion of Canada, which was refused; and he then proceeded to Philadelphia, where the continental congress officially acknowledged his services. He next joined Gen. Schuyler's army as a volunteer, was employed in secret missions to sound the views of the Canadians, and rendered valuable aid in Montgomery's expedition to Canada; but in an unfortunate demonstration against Montreal with a small force of American and Canadian recruits, made on the persuasion of Major Brown, Sept. 25, 1775, he was captured and sent a prisoner to England. A few months later he was sent back to America, and confined in prison ships and jails at Halifax and New York till May 3, 1778, when he was exchanged. During most of his captivity he was treated as a felon and kept heavily ironed, but for a part of 1776-'7 was allowed restricted liberty on parole. Kindly received by congress and by Washington, he was about to enter the military service again when the old colonial troubles regarding Vermont were revived. Allen was now chosen general, and appointed to command all the militia of that state. In the mean time 16 of the western townships of New Hampshire sought annexation to Vermont, sending a petition to that effect to the legislature, who referred the matter to the people. The governor of New Hampshire protested against this course, writing to the continental congress to interpose its authority. Allen was sent as the agent of Vermont to explain to congress the course of the state. About this time the English commanders in America began to meditate the restoration of royal authority in Vermont, and, while the Vermont claim to self-government was in abeyance, sought to take advantage of the dispute. A tempting offer was made to Allen through Beverley Robinson, a well known tory of the time, without any result, except that, by feigning negotiations, Allen was able to preserve the neutrality of the English authorities toward his mountaineers, who were consequently unmolested until nearly the end of the war. Before that time he removed to Bennington, thence to Arlington, and subsequently to the vicinity of Onion river, where he resided till his death, serving for some time in the legislature. He was twice married, and left a wife and several children. In addition to a history of the controversy between Vermont and New York, a narrative of his captivity, and various political pamphlets, he was the author of a work entitled "Reason the only Oracle of Man" (8vo, Bennington, 1784), in which the Bible and the Christian religion are assailed from a purely deistic standpoint.

ALLEN, Ira, brother of Ethan, born in 1752, died in Philadelphia, Jan. 7, 1814. He served in the American army during the revolution, although at first a tory, was a member of the constitutional convention of Vermont, and was the first secretary of the state, afterward treasurer, surveyor general, &c. In 1795 he went to France, where he purchased 20,000 muskets and 24 cannon, expecting to sell them to the state; but while returning home with a portion of them, he was captured and carried to England, under the accusation of furnishing arms to the Irish rebels. A lawsuit of eight years' duration followed, in which he was successful. During this time he published "The Natural and Political History of Vermont" (8vo, London, 1798).

ALLEN, Joseph W., an English landscape painter, born in Lambeth, London, in 1803, died Aug. 26, 1852. He was for a time usher in a school, but soon went to London to study art. At this time he used to paint signs and transparencies to eke out a subsistence, and afterward took up scene painting, finally becoming principal scene painter at the Olympic theatre. He had excelled in depicting quiet rural scenery; but when he began to employ the brilliant effects which should be confined to the stage, the results which he obtained were far inferior to those exhibited in his earlier productions. He was active in the establishment of the "Society of British Artists."

ALLEN, Paul, an American editor and author, born in Providence, R. I., Feb. 15, 1775, died in Baltimore in 1826. After graduating at Brown university, he went to Philadelphia, and was employed to write for the "Port Folio" and the "United States Gazette." In 1801 he published a small volume of poems. He also, about this time, superintended the publication of "Lewis and Clarke's Travels." He became successively the editor of the "Federal Republican" and the "Journal of the Times," but was unsuccessful in both enterprises, sank into extreme poverty, and for a time his reason was obscured. He finally assumed the management of the "Morning Chronicle" at Baltimore, and conducted that journal until his death. In 1821 the "Life of Washington" appeared, published in his name, but really written by John Neal and another of his friends, named Watkins, Allen merely contributing a portion of the preface. His poem of "Noah" was published in 1821, in 5 cantos. It had originally consisted of 25; but, having been placed in the hands of Mr. Neal for revision, he reduced it to its present dimensions.

ALLEN, Samuel, a London merchant and acting governor of New Hampshire, born about 1635, died May 5, 1705. He purchased from Mason's heirs in 1691 a large tract of land in New Hampshire, including Portsmouth and Dover, and extending 60 miles inland. He acted as governor of New Hampshire until the arrival of Lord Bellamont in 1699. His purchase involved him in a protracted lawsuit with the actual settlers, who produced an Indian title, subsequently found to be a forgery, but not until his family had become extinct.

ALLEN, Solomon, an American revolutionary soldier, born in Northampton, Mass., Feb. 23.

1751, died Jan. 20, 1821. He rose to the rank of major during the revolution, commanded the guard which took charge of André on his capture, and assisted in putting down Shays's rebellion at a later period. At the age of 50 he became a clergyman.

ALLEN, Thomas, an American clergyman, born in Northampton, Mass., Jan. 17, 1743, died in Pittsfield, Feb. 11, 1810. He graduated at Harvard college in 1762, and was ordained in 1764 at Pittsfield, of which town he was the first minister. Twice during the war of the revolution he served as chaplain, and in the battle of Bennington he took an active part. He was minister of the same church from the time of his ordination till his death, a period of nearly 46 years, and during this time preached 600 or 700 funeral sermons.

ALLEN, William, D. D., an American clergyman and author, son of the preceding, born in Pittsfield, Mass., Jan. 2, 1784, died in Northampton, July 16, 1868. He graduated at Harvard college in 1802, and studied theology with the Rev. Dr. Pierce of Brookline. After being licensed in 1804 by the Berkshire association, he preached for some months in various parts of western New York. Upon his return he was appointed a regent of Harvard college, and was also assistant librarian of the college. During this period he prepared the first edition of his "American Biographical and Historical Dictionary" (1809), containing notices of about 700 Americans. This was the first book of general biography issued in the United States. In 1807 he prepared the biographical sketches of American ministers for the Rev. David Bogue's and Dr. Bennett's "History of Dissenters," published in London in 4 vols. The second edition of his "Dictionary" appeared in 1832, and contained more than 1,800 names. The third edition, published in Boston in 1857, contains biographies and notices of nearly 7,000 Americans. His connection with the university ceased in 1810, when he was ordained pastor of the Congregational church in Pittsfield, as his father's successor. The legislature of New Hampshire in 1816 altered the charter of Dartmouth college, and created in its stead a university, of which Dr. Allen was made president in 1817. Upon an appeal to the supreme court at Washington, the rights of the college against the state were maintained in 1819. In 1820 Dr. Allen was appointed president of Bowdoin college, Me., and retained that position till 1839, when he resigned it, and retired to Northampton, Mass., engaging in various literary labors. Among these is a collection of more than 10,000 words not found in dictionaries of the English language; nearly 1,500 being contributed to Worcester's dictionary (1846), more than 4,000 to Webster's (1854), and about 6,000 to the new edition of Webster. His other chief writings are: "Junius Unmasked," to prove that Lord Sackville was the real Junius; "Accounts of Shipwrecks;" "Psalms and Hymns," with many original hymns (1835); memoirs of Dr. Eleazar Wheelock, and of Dr. John Codman (1853); "Wunnissoo, or the Vale of Hoosatunnuk," a poem, with learned notes (1856); "Christian Sonnets" (1860); "Poems of Nazareth and the Cross" (1866); and "Sacred Songs" (1867).

ALLEN, William, an English chemist, born Aug. 29, 1770, died near Lindfield, Sussex, Dec. 30, 1843. He was the son of a Quaker silk manufacturer in Spitalfields, and learned chemistry in the pharmacy of Mr. Bevan, in London, to whose business he eventually succeeded. He was for many years lecturer on chemistry and experimental philosophy at Guy's hospital, a fellow of the royal society, and president and one of the founders of the pharmaceutical society. In conjunction with his friend Mr. Pepys he established the proportion of carbon in carbonic acid, and demonstrated that the diamond was pure carbon. Having purchased an estate in Sussex, he devoted himself for many years to improving the condition of his tenantry and poor neighbors, founding schools, building model cottages, and laying out gardens and playgrounds.

ALLEN, William Henry, an officer of the American navy, born in Providence, R. I., Oct. 21, 1784, died in Plymouth, Eng., Aug. 15, 1813. He was a son of Major William Allen, entered the navy as a midshipman in 1800, and in 1809 was appointed first lieutenant of the frigate United States. Oct. 25, 1812, he distinguished himself in the action between this vessel and the British frigate Macedonian, which resulted in the capture of the latter. He afterward received the command of the brig Argus in 1813, with which he cruised in the neighborhood of England, capturing property to the amount, as was estimated, of $2,000,000. On Aug. 14 he fought the British brig Pelican, losing the Argus, and himself dying of his wounds the next day.

ALLEN, William Henry, LL. D., an American scholar and educator, born in Readfield (now Manchester), Kennebec county, Me., March 27, 1808. After preparatory study in the Maine conference seminary, he entered Bowdoin college, where he graduated in 1833. From 1833 to 1836 he was teacher of Latin and Greek in Cazenovia seminary, N. Y.; in 1836 principal of a high school at Augusta, Me., where he became a member of the Methodist Episcopal church; from 1836 to 1846 professor of natural philosophy and chemistry in Dickinson college, Carlisle, Pa.; from 1846 to 1849 professor of philosophy and English literature in the same institution, and in 1847-'8 its acting president; from 1849 to 1862 president of Girard college, Philadelphia, and for one year president of the agricultural college of Pennsylvania. In 1867 he was recalled to the presidency of Girard college, which position he now (1873) occupies. In March, 1872, he was chosen president of the American Bible society. President Allen has contributed to the reviews and magazines many articles on philosophical, literary, and educational questions. He is also the author of numerous addresses and several valuable reports on education. In 1846 he received the honorary degree of M. D. from the Philadelphia college of medicine; and in 1850 the degree of LL. D. from both Union college, New York, and Emory and Henry college, Virginia.

ALLENDE, José, an officer in the Spanish army, of Mexican birth, to whom Hidalgo first intrusted his plan of revolt in September, 1810. Allende was at that time a captain of the Mexican regiment of La Reyna, and brought to the service the military skill of which Hidalgo was so much in need. When the regiment of La Reyna and that of Celaya joined Hidalgo, the native levies gained some consistency, and in the same month achieved the famous capture of the Alhondega of Guanajuato. After Nov. 29, 1810, Allende joined Hidalgo, and was able to replace the guns which had previously been lost at Aculco, by bringing others from San Blas, the great naval station of Spain on the Pacific, of which Morelos had obtained possession. Contrary to the advice of Allende, Hidalgo determined to fight the enemy, and was defeated. Allende brought off the fragment of the army, but was arrested near Saltillo by the treachery of an old comrade named Elizondo, and shot at Chihuahua, July 27, 1811.

ALLENTOWN, capital of Lehigh county, Pa., on the W. bank of Lehigh river, 18 m. above its junction with the Delaware, and 59 m. by railroad N. N. W. of Philadelphia; pop. in 1860, 8,025; in 1870, 13,884. In 1762 the town was laid out and called Northampton, the name of the county it then belonged to. It contained 13 families. In 1776 there were 54 houses, of which 7 were taverns. In 1812 Lehigh county was established and Northampton was made the county town, having been incorporated as a borough the year previously. In 1838 the name was changed to Allentown. By a railroad extending up and down the valley of the Lehigh, it is connected in one direction with the anthracite coal region at the head waters of this stream, and in the other with New York and Philadelphia. Another railroad 36 m. long connects the Lehigh valley with that of the Schuylkill above Reading, and affords the most direct line of communication between New York city and the southwest. By these railroads and the Lehigh canal, Allentown is made a very important central point for supplies of iron ores and anthracite. Several large blast furnaces, extensive iron works, rolling mills, tanneries, and woollen factories are in operation. The population of Allentown are mostly of German descent, and the German language is still commonly spoken. It has 3 daily newspapers, 6 weekly, 1 semi-monthly, and 2 monthly periodicals. The Allentown female college was established in 1870. Muhlenberg college, a Lutheran institution, was established here in 1867; in 1868 it had 10 instructors, 161 students, and a library of 1,800 volumes.

ALLESTREE, or **Allestrey, Richard**, an English divine, born in Uppington, Shropshire, in March, 1619, died in January, 1681. During the civil war he left his studies at Oxford to serve as a soldier in the king's army. Toward the conclusion of the war he took orders, and was one of those expelled when the parliament in 1648 sent visitors to Oxford to demand the submission of the university. He found an asylum in the family of Lord Newport in Shropshire, and after the battle of Worcester he was fixed upon by the royalists as a proper person to convey despatches and have a conference with the king at Rouen; and he was afterward the constant medium of communication with him. Soon after the return of Charles II. he was made canon of Christ's church, king's chaplain, regius professor of divinity, and in 1665 provost of Eton. Forty of his sermons were published in 1684, with a life by Bishop Fell.

ALLEYN, Edward, an English actor, born in London, Sept. 1, 1566, died at Dulwich college, of which institution he was the founder, Nov. 25, 1626. He was the friend of Jonson and Shakespeare, and partner of Henslowe as a theatrical manager and proprietor of the bear gardens. Having become rich, he purchased the manor of Dulwich in 1606, built his college there, and entered the institution with his wife, contenting himself with the same allowance of food and clothing as each of his pensioners. At his death he left property for the endowment of 20 almshouses, besides legacies to his wife and relatives. (See DULWICH.)

ALL-FOURS, a game played by two or four persons with an entire pack of cards. It derives its name from the four chances therein, for each of which a point is scored; these are: high, the best trump out; low, the lowest trump out; jack, the knave of trumps; and the game, the majority of pips reckoned for certain cards held by the respective players, every ace being counted 4, king 3, queen 2, knave 1, and ten 10.

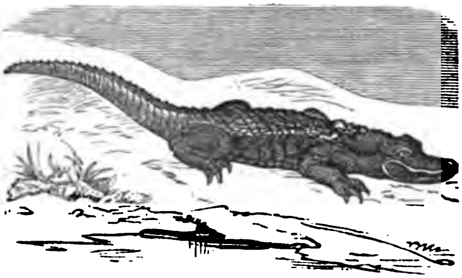
ALLGAIER, Johann, a German chess player and writer on the game, died at Prague in 1826. For some years he was a captain in the Austrian service. He spent most of his life in Vienna. His work *Anweisung zum Schachspiel*, was first published at Vienna in 1795, and has since passed through numerous editions. A peculiar method of opening the game received from him the name of the Allgaier gambit.

ALL HALLOWS. See ALL SAINTS' DAY.

ALLIBONE, Samuel Austin, LL. D., an American author and bibliographer, born in Philadelphia, April 17, 1816. After some years spent in collecting materials for the purpose, he began in 1853 the composition of "A Critical Dictionary of English Literature and British and American Authors, Living and Deceased, from the Earliest Accounts to the latter half of the Nineteenth Century." This work, in 3 vols. royal 8vo (1858, 1870, and 1871), contains notices of 46,499 authors and 40 classified indexes of subjects. Dr. Allibone is also the author of some religious controversial essays, and has contributed articles to the "North American Review," the "Evangelical Quarterly Review," and other periodicals; and he has privately printed and circulated a number of tracts.

ALLIER, a central department of France, part of the old province of Bourbonnais, bounded by Nièvre, Saône-et-Loire, Puy-de-dôme, Creuse, and Cher; area, 2,822 sq. m.; pop. in 1872, 390,812. It takes its name from the river Allier, which flows through its centre; the Cher, like the Allier a southern affluent of the Loire, flows through the western part of the department, and the Loire waters its eastern border. The surface is undulating, and the soil generally fertile, yielding much grain and wine. Coal and minerals of various kinds abound; and there are celebrated mineral springs. The department is divided into the arrondissements of Moulins, La Palisse, Gannat, and Montluçon. Capital, Moulins.

ALLIGATOR (Fr. *alligator*, It. *alligatore*, corrupted from the Sp. *el lagarto*, the lizard), a large carnivorous, amphibious reptile, of the saurian family, peculiar to America. The name was first given to this animal by the English colonists of the southern portion of what are now the United States, but has been gradually extended to all the varieties of the family, called caymans, crocodiles, jacarés, &c., by the Spaniards, Portuguese, and Indians of the southern continent. The alligator was formerly believed to be identical with the crocodile of the old world; but there have subsequently been found to exist distinctions which indicate generic differences. The generic characteristics of the family are long flat heads, thick necks and bodies, protected by regular transverse rows of long plates or shields, elevated in the centre into keel-shaped ridges, and disposed on the back of the neck into groups of different forms and numbers, according to the species. The mouth is extremely large, extending considerably behind the eyes, and furnished in each jaw with a single row of conical teeth, all of different sizes, and standing far apart from one another. The eyes are placed on the upper surface of the skull, very near to each other, and provided with three eyelids. The feet have five toes before, long and separate; four behind, more or less perfectly connected by membranes; the interior toes only, on all the feet, being provided with claws. The tail is of great length, slender, strongly compressed at the sides, and surmounted toward its origin by a double series of keel-shaped plates, forming two upright denticulated crests, which, gradually converging toward the middle of the tail, there unite and form a single row to the extremity. The tail is the animal's great instrument of progression in the water, and its great weapon of defence when surprised on land. Both genera, alligators and crocodiles, hibernate, taking no food during the winter months; the Nilotic crocodiles, according to Pliny, withdrawing into caves and holes in the banks, while the alligators of America bury themselves in the mud of stagnant rivers. The principal food of both alligators and crocodiles is fish, but they watch for and devour land animals and even men. It is alleged that the musky fluid secreted from the glands of the throat acts as a sort of bait, and attracts the fish on which they prey. The alligators, according to Cuvier, have the head less oblong than the crocodiles. Its length is to its breadth, measured at the articulation of the jaws, as three to two; the teeth are unequal in length and size; there are at least 19, sometimes even as many as 22, on each side in the lower, and 19 or 20 in the upper jaw. The front teeth of the under jaw pierce through the upper at a certain age; and the fourth from the front, which are the largest of all, enter into corresponding holes of the upper jaw, in which they are concealed when the mouth is closed. The hind legs and feet are round, and neither fringed nor pectinated on the sides; the toes are not completely webbed, the connecting membrane only extending to their middle; and finally, the post-orbital holes of the cranium, so conspicuous in the crocodiles, are very minute in the alligators, or even entirely wanting. Further than this, it is observable that the alligators, unlike the crocodiles, are rarely if ever to be found in running streams, preferring stagnant ponds and the creeks of large rivers, in which, particularly in South America, they may be seen in great numbers, protruding their large flat heads through the leaves of the nymphæa, pontederia, and other aquatic plants, and watching for their prey; or sometimes basking in the sun, or sleeping on the banks. They rarely come on shore, except during the hottest part of the day, and always retire to the water on the approach of night, during which they are extremely active in search of their food. They generally lay from 50 to 60 eggs in one place, of about the same size as those of the goose, which they cover up with sand, and leave to be hatched by the heat of the sun, never, however, removing to any great distance. When the young ones come forth, they are five or six inches long, and are immediately conducted to the water by the female alligator. Seldom more than half the brood long survive, the re-



Alligator.

mainder being devoured by the male alligators, and by various ravenous fishes; while multitudes are destroyed in the egg by the vultures. The alligators never leave the fresh water, while the crocodiles frequent the mouths of the large rivers, and swim out into the open sea, passing between different islands at considerable distances. So perfect a characteristic is this of the two genera, that the animal of the West India islands, which swims out into the salt water, is distinctly a crocodile, varying from all the other American species, and exhibiting the modifications which belong only by right to those of the old world.—The principal species are: 1. The alligator, properly so called, *crocodilus lucius* of Cuvier, *alligator Mississippiensis* of Gray, inhabiting the waters of the southern states. It grows to the size of 14 or 15 feet; its head is one seventh of the entire length, and half as broad at the articulation of the jaws as it is long. It has these distinguishing modifications from the crocodiles: The snout is flattened on its upper surface, and slightly turned upward at the extremity; its sides are nearly parallel, and the nose forms a regular parabolic curve. It is from this similarity to the head of a pike that it has its name *lucius*. It is said to be far more fierce and voracious than the South American species, often seizing and destroying men and large land animals, the bodies of which it conceals under the banks until they begin to putrefy, when it draws them ashore and devours them; for its teeth, unfitted for mastication, cannot cut the flesh in its sound state. The female of this species is remarkable for her maternal attention to her young, never losing sight of her nest until the little alligators are released from the shell. Bartram, the American naturalist, found great numbers of these reptiles in a mineral spring near the Mosquito river, Florida, though the water at its exit from the earth was nearly at the boiling point, and strongly impregnated with copper and vitriol. 2. The cayman, *alligator palpebrosus*. This species is distinguished by its bony eyebrows, which form knobs as large as the fists of a man. Its toes are almost entirely free from connecting membranes, and its skull has no post-orbital apertures. It is smaller and less fierce than the others of its genus; and the female takes no heed to her eggs when they are once deposited. This is the alligator of Guiana and Surinam. 3. The alligator of Brazil, *alligator trigonatus*, a variety of the above species, distinguishable from it by a long ridge between the orbits running toward the snout, a notch in the posterior margin of the skull, and a peculiar arrangement of the cervical plates. 4. The jacaré, *alligator sclerops*. This is the alligator of all tropical America, particularly numerous in Brazil. Its head is more elongated than that of the North American alligator, the sides converging toward the snout so as to form nearly an isosceles triangle. The bones of the skull have a rough scabrous appearance, as if diseased; and the orbits of the eye are surrounded by prominent rims of bone, connected by a ridge between the orbits, constituting together the resemblance of a pair of spectacles, whence its name. It grows to a very large size, attaining even to 18 feet, its length being more than eight times that of the head. It never attacks men, or even dogs, whether on land or in passing rivers, unless in the neighborhood of its nest; nor does it then prey on the carcasses, feeding only on fish and water fowl. —The bony armor of all the species is their protection against all enemies. It is proof against the rifle ball, which can only take effect when it strikes the eye, or the unarmed skin on the belly and about the insertion of the fore legs. The construction of this armor, however, prevents them from turning rapidly when on dry land, so that their pursuit is easily avoided. Their flesh, and even their eggs, although both have a strong musky flavor, are said to be both wholesome and nutritious. The American alligators have neither their allied protector bird, the spur-winged dotterel, nor their characteristic enemy, the ichneumon, which protect or assail the crocodile of the Nile. The hideous aspect, disgusting habits, abominable smell, and odious roar of these reptiles have rendered them objects of undue apprehension. (See CROCODILE.)

ALLINGHAM, William, a British poet, born at Ballyshannon in Ireland about 1828. His father, a banker in his native town, gave him a good education in Irish schools; and he early showed a taste for literary pursuits, contributing to various periodicals. In 1850 he published a volume of poems, which he dedicated to Leigh Hunt, who had long appreciated and encouraged his work. In 1854 he published "Day and Night Songs," of which an enlarged edition, illustrated by artists of note, appeared the next year. In 1864 he published a poem in twelve chapters, entitled "Laurence Bloomfield in Ireland;" but it is by his short lyrics that he is best known. He has for some years held a government appointment in the English customs service, and he has also been since 1864 in receipt of a literary pension. He has edited "The Ballad Book."

ALLIX, Pierre, a French Protestant divine, born in Alençon in 1631, died in London, March 3, 1717. While pastor of a reformed congregation at Charenton he assisted Claude in preparing a new French version of the Bible, and acquired some celebrity by a controversy with Bossuet. On the revocation of the edict of Nantes he took refuge in England, established a French congregation in conformity with the Anglican church, and in 1690 was appointed by Bishop Burnet treasurer of Salisbury cathedral. He made several attempts, in Holland, Switzerland, and Germany, to cement a more perfect union among the reformed churches. Besides a number of theological and critical works in French and Latin, he wrote in English (of which he was an excellent master) "Reflections upon the Books of Holy Scripture" (1688); "Remarks on the Churches of Piedmont" (1690); "Remarks on the Ancient Churches of the Albigenses" (1692), &c.

ALLOA, a seaport town of Clackmannanshire, Scotland, 30 m. E. N. E. of Edinburgh, at the head of the frith of Forth; pop. about 7,000. It has an excellent harbor, and a dry dock capable of containing the largest ships; also a spacious wet dock opened in 1863. In the town and its vicinity are extensive collieries, distilleries, breweries, and iron, glass, brick, and tile works.

ALLOBROGES, a people of Gaul, whose territory comprehended parts of what is now called Dauphiny and Savoy, chiefly between the Isère and the Rhône. Their principal town was Vienna, now Vienne, on the left bank of the Rhône. They were brought under the dominion of Rome in 121 B. C., by Fabius Maximus, and ever after remained faithful to their conquerors, though at times discontented. Their name signified "dwellers on mountains."

ALLODIUM, in law, a landed possession freed from all feudal tenure or service. Several explanations have been given of the etymology of the word, but they are all only more or less ingenious conjectures. In early ages the allodium was the most desirable property. In process of time the anarchy consequent on the want of a supreme power made the mutual protection and support of lord and vassal more expedient; and in England all land passed into fee land, the king being suzerain of the whole country. The theory still remains in slight services, or in small fee farm rents, and in the escheat to the sovereign for want of heirs. In France, before the revolution of 1789, the actual services still remained—not nominal, but real, unequivocal, and in some cases odious burdens; serfdom, indeed, was only abolished by an express decree of the assembly. *Nulle terre sans seigneur* was a maxim of law, and the tyranny and monstrous oppressions of the local seigneur proved that it was no dead letter. In Germany the allodium yet remains to be perfected. The system of man service is not yet exploded, such as the right to several days' work in harvest or at hunting parties; although this is much modified, particularly in Prussia, of late years. The conversion of the feudal soil into allodial land is effected either by means of an annual fee rent, or of a fine payable at once, in lieu of all customary services. Even in 1595 the last traces of bondage and serfdom in England were not obliterated. A patent to Sir Henry Lea was issued by the crown, giving him power as commissioner to enfranchise a limited number of crown villeins, and to seize all the rest of the estates acquired by parties in villenage to his own use. This monstrous commission, which was, like many other similar enormities, a means of enriching a needy or profligate courtier at the expense of the people, could not have operated except in the case of crown serfs; the doctrine, *Nullum tempus occurrit regi*, coming into operation against the unfortunate landholders whose title was barred by the impurity of their blood. In the case of subjects, villenage had become obsolete.

ALLOM, Thomas, an English architect and landscape painter, born in 1804. His reputation rests chiefly on his published works illustrating the scenery, architecture, and antiquities of England, France, and the East.

ALLOMAKEE. See ALLAMAKEE.

ALLOPATHY, a word created by homœopathists to distinguish other systems of medical practice from their own. Having adopted the opinion that "like cures like" (*similia similibus curantur*) as the fundamental principle of his doctrine, Hahnemann gave to his own system the name of "homœopathy," derived from the Greek ὁμοιὸν, like, or similar, and πάθος, disease, and to other systems the name of "allopathy," from ἄλλον, other, or different, and πάθος, disease.

ALLORI. I. Alessandro, a Florentine painter, born in 1535, died in 1607. He was a nephew and pupil of Agnolo Bronzino, whose name is sometimes given to him. Michel Angelo was his chief model, and he is reputed one of the best artists of the anatomical school. He excelled also as a portrait painter. **II. Cristofano,** also called Bronzino, son of the preceding, born in 1577, died in 1621. He painted several important works for the Florentine churches and convents and the palace of the Medici, and excelled in coloring and delicacy of execution. His best known work is "Judith with the Head of Holofernes," in the Pitti palace, but his St. Julian in the same gallery is esteemed superior to it. His works are very rare.

ALLOTROPISM (Gr. ἀλλότροπος, in another manner), a word first employed by Berzelius to denote the property in virtue of which the same element can have different chemical characters. There exists a vast series of phenomena, of which polymorphism constitutes the first term, allotropism the intermediate, and isomerism the extreme term. Sulphur, which crystallizes from its solution in octahedra of the fourth system, when crystallized by means of fusion forms prisms having a rhombic base, of the fifth system; this is a polymorphous body. Phosphorus being heated changes its properties; if we heat it still further, it regains its original condition. It can therefore exist in two different states, but it is always phosphorus. This is a phenomenon of allotropism. The formiate of ethyl, $C_3H_6O_2$, and the acetate of methyl, $C_3H_6O_2$, are two perfectly distinct bodies, although they have the same quantitative composition; they are isomeric. To take an illustration from natural history, allotropism only makes races, isomerism creates distinct species. Isomeric bodies receive distinct names; but sulphur, phosphorus, oxygen, carbon, &c., in their modified forms, that is, in their allotropic conditions, are still sulphur, phosphorus, and oxygen. Originally the word allotropism was only applied to elements; later it was also applied to compounds. Tartaric acid which turns the plane of polarization of light to the right, tartaric acid which turns it to the left, and that which does not deviate it at all, are considered by some chemists to be the same compound in several allotropic states. (See ISOMERISM.)

ALLOUEZ, Claude Jean, one of the earliest Jesuit explorers of the northwest, born in France in 1620, died in 1690. He went to Quebec in 1658, and, after some years' training in the Algonquin missions on the St. Lawrence, founded the mission of the Holy Ghost at Chegormegon on Lake Superior in 1665, collected data as to the Mississippi, explored Green bay, where he founded the mission of St. Francis Xavier, and labored among the Foxes, Mascoutins, Miamis, and Illinois. In 1676 he permanently established at Kaskaskia in Illinois the mission begun by Marquette; but in 1679 he retired on the approach of La Salle, who was bitterly opposed to the Jesuits. His latest field of labor was among the Miamis on St. Joseph's river, where he died. His contributions to the Jesuit *Rélations* are among the most valuable records as to the ideas and manners of the Indians at the time.

ALLOY (Fr. *aloi*, standard of coin, from *à la loi*, according to law), a compound of two or more metals fused together. When one of the metals is mercury, the compound is called an amalgam. (See AMALGAM.) By the alchemists metals were called "noble" and "base," and when one of the latter was brought into combination with one of the former, the nobility of this was said to be "allayed" or "alloyed," and assayers at the present day still use the term in this sense. Most alloys are mixtures of no exact proportions; the metals dissolve in one another indefinitely, as sulphuric acid unites with water. Some, however, appear to be combinations in equivalent proportions, and of these there are found examples in nature, as of the native gold, which occurs combined with silver—4, 5, 6, or 12 atoms of gold to one of silver, but never a fractional part of an atom of gold. The tendency of some alloys to take crystalline forms also indicates definite combinations. This is verified by cooling a melted mixture slowly, and when partially solidified pouring off the liquid remnant, when crystals are left which are always combinations in the proportion of the atomic weights of the metals; for instance, in the mixtures of copper and tin (bronze), copper and zinc (brass), copper and nickel (German silver), or copper and aluminum (aluminum bronze), the proportions of the crystals are found to be either in the ratio of the numbers 64, 118, 65, 59, 27, which are the respective atomic weights of copper, tin, zinc, nickel, and aluminum, or of a multiple the one of the other. The metals of many alloys are with difficulty brought into combination, and even tend to separate from each other while in the melted state, and in some instances form layers which contain different proportions of the metals.—The changes in the physical properties of metals effected by their combinations are of great variety, and cannot before experiment be at all anticipated. Even slight variations in the proportions of the metals involve great changes in the product of their union. The specific gravity of the alloy may be greater or less than the mean of that of the component parts. In the alloy of gold and tin it is greater; also of silver with zinc, lead, tin, bismuth, or antimony; copper with zinc; lead with palladium; bismuth with antimony; lead with bismuth; and zinc with antimony. The specific gravity is less in the alloy of gold with silver, lead, iron, copper, nickel, or iridium; also of iron with bismuth, zinc, antimony, or lead; tin with lead; zinc with palladium or antimony; and zinc with antimony. The alloy of silver and copper as used in coins is also of less specific gravity when cast; but Karnmarsch found that by rolling and coining it is so far compressed that the specific gravity is the same as the mean obtained by calculation. Alloys are always more fusible than the metal most difficult to melt that enters into their combination, and generally more so than the most easily melted one. The fusible metal discovered by Sir Isaac Newton melts at different temperatures between 198° and 210° F. It is composed of bismuth 5 or 8 parts, lead 2 or 5 parts, and tin 3 parts. These metals melt, the first at a temperature of 476°, the second at about 600°, and the last at 442°. The addition of one part of mercury lowers the melting point of this alloy to 167°. Wood's fusible alloy, discovered in more recent times, consists of 2 parts cadmium, 2 tin, 2 lead, and 8 bismuth; it melts at the low temperature of 158° F. The alloy fusible at the lowest temperature is that of sodium and potassium; the first melts at 194°, the second at 128°, while the alloy melts at 80°, and is thus liquid at the common summer temperature. Alloys conduct heat and electricity less perfectly than their pure metals; they are also generally more brittle. But their power of cohesion is usually greater than that of either of the metals, the alloy resisting more strongly the force applied to draw a bar apart than does a bar of either one of the metals composing it. The color which the alloy will take is as uncertain as any of its other properties. A large addition of zinc will not make its alloy with copper whiter, but will give it the rich pinchbeck hue. Tin makes copper more pale, but especially nickel, the addition of one eighth of which is sufficient to make it almost white. Aluminum acts in a similar way, while silver possesses the power of destroying the red color of the copper in so high a degree, that it may be largely alloyed with it without materially impairing its whiteness. Alloys composed of metals of different degrees of fusibility may sometimes be separated into their distinct metals by heating to the melting temperature of one of them. An alloy of tin and copper may be thus treated, the tin melting at 442°, and the copper at 1,996°. This "sweating process," called liquation, is used to separate silver from copper. Lead is first melted in with the other metals, and when sweated out it takes the silver along with it. This alloy is then separated by another process, depending on the easy oxidation of the lead. An interesting property of the metals, which may seem somewhat opposed to the one just described, is the tendency of one, when melting, however fusible it may be, to cause any other in contact with it, however infusible, to dissolve in the melted metal; its surfaces are washed away, till nothing solid is left. Platinum, which is among the most difficult metals to melt, is very susceptible of injury from this cause. The costly crucible and other vessels of the chemist may be ruined in an unguarded moment by contact with other metals highly heated. On this property is based the principle of soldering two pieces of metal by means of a third. Their surfaces are fixed together by interposing an alloy which is more fusible than either of the metals to be joined; and this must also consist of metals which are disposed to unite and form a new alloy with them. Pieces of gold are soldered together with an alloy of gold with silver or with copper; articles of silver with an alloy of silver and copper; of copper, with an alloy called hard solder, which is brass containing a large proportion of zinc. Another interesting property of alloys is the different effects produced by the order in which their component parts have been mixed, the proportions continuing the same. Ten parts of antimony added to 90 of tin and 10 of copper, make a compound of very different physical properties from that produced by adding 90 parts of tin to 10 of copper and 10 of antimony. This appears to be analogous to what we witness in vegetable chemistry, as in the identity of composition in starch and sugar.—The alloys already in use are very numerous, and new valuable combinations are continually discovered. Those alone of copper with zinc form a long list, in which we find the names of many very useful compounds, some of them known from the time of Tubal Cain. Pewter has long been a useful, though a very homely alloy. It is made of different combinations of lead and tin, sometimes with additions of antimony, bismuth, and copper, and in this case is known in trade under different fanciful names, as britannia, &c. German silver, composed of copper, nickel, and usually zinc, has in part displaced it, and is likely to be itself displaced by some improved combinations. Muntz's yellow metal is an alloy of 60 parts of copper to 40 of zinc. These proportions may be slightly varied, but they are the ones specially recommended in the patent, as producing a composition more easily rolled into sheets while hot. It is used for sheathing the bottoms of ships. In importance, no alloys can rank higher than those of which printers' types are made, and no known metal possesses the properties essential to them. They consist of lead and antimony, in proportions varying with the kind of types. For very fine types tin is added, to increase the fusibility and consequently to make the metal flow better, so as to fill the finest details of the mould. Many type founders introduce also some copper, by first alloying it with the antimony; this increases the durability of the type considerably. The noble metals, gold and silver, are too soft to be used in a pure state. They are alloyed with copper to give them hardness, and gold also with silver. The standard silver of Great Britain consists of silver 11·10, and copper 0·90. The French silver plate contains 9·5 parts of silver and 0·5 copper; trinkets, 8 parts of silver to 2 of copper. In the United States these alloys are made as rich or as poor as the individual manufacturer judges best for his interest. His reputation is the only guarantee that his work is what it is sold for. There is no test but actual analysis, and this is not applicable to the articles without destroying part of them. Specific gravity may be employed to some extent, but as the alloy often has a somewhat different density from that of the mean of its metals, the calculation gives an approximation more or less correct according to circumstances. The following rule given by Dr. Van der Weyde may be used to find the specific gravity of an alloy made of any number of metals, mixed in whatever proportion: "Find the relative volume of each metal by dividing its weight by its specific gravity; the sum of all the weights divided by the sum of the volumes gives the specific gravity of the alloy."—An alloy which closely resembles gold in color, specific gravity, and ductility, is made of 16 parts of platinum, 7 parts of copper, and 1 of zinc. These are put into a crucible, covered with charcoal powder, and melted. Its cost is scarcely one fourth of that of gold. The so-called oroide gold is a very base alloy, only resembling gold in color if kept clean, and is easily distinguished from it by having scarcely half its specific gravity. It is said to be made by melting copper 100 parts, tin 17, magnesia 6, carbonate of potash 9 or salt of antimony 3·6, and quicklime 1·6. The latest improvement is the so-called sterrometal, invented by Rosthorn in Vienna; it is made by melting 600 lbs. copper with 2 lbs. cast iron; when fluid there is added 36 lbs. zinc and 4 oz. borax. It is asserted that it is 8,000 lbs. stronger per square inch than the best wrought iron. Alexander Birchholz of Hartford, Conn., has patented the same alloy, and erected a factory in Providence, R. I.—Among interesting applications of alloys we must mention the plates of easily fusible metals with which steam boilers are sometimes provided, offering an additional safety besides the safety valve, as they will melt at a temperature corresponding with too high a pressure. Another application is founded on the fact that alloys are much more imperfect conductors of electricity than the separate metals, from offering more resistance. Small coils of wire are made of an alloy similar to German silver, in which the resistance is equal to many miles of telegraph wire; they are used in connection with voltameters to measure the strength of batteries, and to detect imperfections or breaks in telegraph wires.

ALL SAINTS' BAY, or **Bahia de Todos Santos,** in the province of Bahia, Brazil, one of the largest and finest natural harbors in the world. It is 37 m. long and 27 wide, and its surface is dotted with islands. The town of Bahia lies on the E. side of the bay.

ALL SAINTS' DAY, a festival in honor of all the angels and saints of heaven, observed in the Roman Catholic church on Nov. 1, and also in the Protestant Episcopal and Lutheran churches. In the eastern churches the same festival has been observed since the 4th century. In the West, it was instituted by Pope Boniface IV. in the early part of the 7th century, on the occasion of dedicating the Pantheon, a temple built by Marcus Agrippa, 25 B. C., in honor of Jupiter the Avenger and all the gods, to the worship of the true God, under the invocation of the Virgin Mary and all the saints. The feast became general in the 9th century. It is also called All Hallows.

ALL SOULS, the day after All Saints, set apart by the Catholic church for the commemoration of all the faithful departed, for whom the mass of requiem is said, and the office of the dead recited. In Germany, the people, both Catholic and Protestant, visit the graveyards on this day, and strew flowers on the graves of their friends.

ALLSPICE, or **Jamaica Pepper,** the immature berry of the *Eugenia pimenta*, so named from its being supposed to combine the flavor of several other spices, such as cinnamon, cloves, and nutmeg. The allspice, pimento, or bayberry tree is a native of South America and the West India islands, especially Jamaica. The tree is of a highly ornamental character, often upward of 25 or 30 feet in height; the leaves inclining to oval, covering the numerous branches with a luxuriant evergreen foliage; the flowers small and without show, succeeded by spherical berries with a persistent calyx, and a fragrant aromatic odor. When they are quite ripe, they are of a dark purple color, and filled with a sweet pulp. In many parts of Jamaica the allspice tree grows in great abundance without cultivation, but it is not easily propagated by artificial means. The commercial value of the fruit makes it an object of great interest with the planters, and no crop receives a larger share of attention. The favorite situation for a pimento walk, or plantation, is among the hills on the north side of the island. A spot is selected in the vicinity of another plantation, or in a locality favorable to the spontaneous growth of the trees; this is stripped of all other wood, and the young pimento plants soon make their appearance, either from seeds previously existing in the soil, or which have been deposited by birds, who feed upon the berries with great avidity. It is said that a single tree has been known to produce 150 lbs. of the raw fruit, or 100 lbs. of the dried spice. The crop, however, is uncertain, and abundant only once in five years. The berries require care in gathering as well as drying. They must be picked when they have attained full growth, but before they begin to ripen, and carefully dried. When the seeds are allowed to ripen fully, they lose that aromatic warmth for which they are esteemed as a spice, and acquire a taste almost exactly like that of juniper berries, which renders them agreeable food for birds, the most industrious planters of these trees. The leaves and the bark participate in the warm aromatic properties of the berries.

ALLSTON, Washington, an American painter, born at Waccamaw, S. C., Nov. 5, 1779, died in Cambridge, Mass., July 9, 1843. From considerations of health he was removed in his early boyhood to Newport, R. I., and completed his education at Harvard college, where he graduated in 1800. Having developed a decided inclination for painting, he went in 1801 to London and became a student of the royal academy, then under the presidency of his countryman Benjamin West, to whom he was indebted for many useful hints in the prosecution of his art. A three years' course of study in London was succeeded by a lengthened sojourn in Rome, where he familiarized himself with the works of the old masters, and gained a reputation as a colorist. During a brief visit to America in 1809 he married a sister of Dr. William Ellery Channing, and returning soon after to London entered upon his career as an artist. Within the next few years he produced a number of works of great merit, founded for the most part on subjects taken from sacred history. Two of these, "The Dead Man Revived by touching the Bones of Elijah," and "Uriel in the Sun," displaying high imaginative power and a rare mastery of color and chiaroscuro, obtained for the artist valuable prizes from the British institution, and all of them found ready purchasers. He returned to America in feeble health in 1818, and during the remainder of his life resided principally in Boston and Cambridge. His subsequent career was without the incentive to exertion which he had experienced in England. His countrymen respected him for the reputation he had acquired abroad, but were scarcely able to appreciate his talents. Removed from the congenial atmosphere of the great art capitals of the old world, he worked listlessly and irregularly, and produced no finished performance of importance comparable in merit with his earlier pictures. During the last 25 years of his life he occupied himself from time to time on a composition of great size representing "Belshazzar's Feast," which he intended should be his masterpiece. But frequent attacks of illness, an over-fastidiousness of taste, and an ideal which became more exalted and exacting as he advanced in years, seriously marred the progress of the work, and it remained at the close of his life an unfinished but splendid specimen of his genius. It is now the property of the Boston Athenæum. Allston's works are not numerous, considering the extent of his career, but bear the imprint of an original and artistic mind. The best are founded on Scriptural subjects. He also painted landscapes and sea pieces of great excellence, and in ideal portraits combined an almost unrivalled purity of flesh tints with depth and power of expression. Had he possessed the moral courage and the physical ability to embody on the canvas his own conceptions, he would have proved one of the most prolific and imaginative artists of the age. No American painter has yet approached him in the delineation of sacred history. Allston was a man of fine literary tastes, and conversed with ease and eloquence on art and metaphysics. He published a volume of poems and a novel, "Monaldi," illustrating Italian life.

ALLUVIUM (Lat., from *alluere*, to wash upon or against), the deposits of sand, gravel, marl, &c., brought down by running streams of the present geological period. Other recent accumulations also, as those of peat and of the hills of sand blown together by the wind, are often called alluvial. They all belong to Lyell's uppermost group, the post-tertiary, and are characterized by containing human relics and remains. The same group comprises the calcareous rocks of recent origin which occur on the coast of Guadeloupe, and contain human skeletons imbedded in solid limestone, and also the coral reefs which are in process of formation in tropical seas, spreading out in calcareous strata hundreds of miles in extent. These are not usually included in the term alluvium; and yet it is not easy to draw a line that shall exclude any formations of recent origin; for the wash of rivers, as it settles in the bays at their mouths, often finds some cementing matter that soon binds it into solid rock, and in this hard rock are entombed as fossils works of art or remains of man. Thus the term alluvium has no precise signification. The great deposits of alluvium accumulate so slowly and silently, that we little appreciate the immense changes made by running water upon the surface of the earth; yet in the short period from the time to which our records extend back, we find that the sediments of a few small Italian rivers have carried out the coast line into the gulf of Venice from 2 to 20 miles; and that the ancient port of Adria, which in the time of Augustus gave its name to the gulf, is now an inland town, 15 miles from the shore. According to Herodotus, the ancient priests of Egypt regarded their country as "the gift of the Nile." From the great pyramids down to the sea all is made land. The great rivers of the world, as the Mississippi, Amazon, Ganges, and Orinoco, are producing effects far greater than those of the Nile; but our observations of these extend but a few generations back, and we lack sufficient data for calculating very exactly the rate of increase of their deltas. With the Mississippi, however, this has been attempted by Mr. Forshey, an eminent engineer, from observations extending through 30 years. Adopting the estimate of Dr. Riddell of New Orleans, that the weight of sediment is $\frac{1}{1245}$ of that of the water, or $\frac{1}{3000}$ of its volume, and allowing the quantity of water brought down per second to be 447,199 cubic feet, the whole amount of sedimentary matter annually added to the delta and carried into the gulf is equal to 4,083,333,333 cubic feet, enough to cover 144 square miles one foot deep. And yet at this rate, for the river to have built up the great accumulations of alluvium which make its delta, would have required 61,000 years; and higher up there are the accumulations at this rate of some 30,000 years more. Thus long at least, it is probable, the great rivers have flowed as they now flow; and during this latest epoch few changes have occurred in the lower forms of animal life; for in the strata next older than these alluvial deposits, the land and river shells are all of the same species with those now living in the same region. Subsequent investigations by Capt. Humphreys and Lieut. Abbot (1858) have given results which will be described under MISSISSIPPI RIVER.—The delta of the Ganges and Bramapootra is far more extensive than that of the Mississippi. It is a wilderness filled with a labyrinth of rivers and creeks, infested with tigers and crocodiles, and larger than the principality of Wales. The rivers pour down their turbid waters charged with sediment, and abounding with the ruins of animal and vegetable life. These are swept into the bay of Bengal, the waters of which are discolored by the fine mud nearly 100 miles from its mouth, while the heavier materials subside near the shores and build up the alluvial strata. Near Calcutta, it was ascertained on boring for water that these strata continue below the surface to the depth reached, which was 481 feet. They were alternations of beds of clay and of marl, with others of decayed vegetable matter like peat, which last no doubt had at times formed the surface, until submerged by subsidence, and then buried beneath the deposits of the rivers. In these strata various fragments of fossil bones and shells were brought up, all of which indicated the existence of the same animals that now inhabit the region.—What the rivers are accomplishing in the interior, the tidal currents are effecting along the coasts. They wear down what has been built up in former times, and strew the materials in new deposits of alluvium. In Germany these accessions, called *Anländung*, are of great value along the coast of the North sea. On the American coasts they are more commonly of a sandy character, stretching out in long beaches, the material of which is blown inland by the winds and piled into barren hills. The long sandy strip of land called the Great South Beach on the S. side of Long Island, which is a remarkable example of these sandy strips or "spits," is more than 100 miles in length, exceeding any such accumulation in Europe. These sands are now formed into alluvial beds by the action of the winds and of the ocean currents; but there is good reason to believe that the greater proportion of the superficial covering of the rocks of Long Island is nothing more than the accumulations of sediment discharged by the Hudson, Hackensack, Passaic, and Raritan rivers.—Alluvial deposits are frequently found in positions above the level of present running waters. Thus, around the shores of some of our great lakes are occasionally seen in the banks layers of sand and clay containing the same species of shells that are now common in their waters, but several feet above their reach. It was during this modern period of the formation of the alluvium that the gigantic mammoths and mastodons became extinct. Their bones are found in the peat bogs and marl beds, the origin of which probably does not extend far back from the introduction of man. Indeed, if we may place confidence in the traditions of the American aborigines, we must believe that these animals were contemporary with man. Within the ribs of a mastodon found in Warren county, N. J., in 1845, were seven bushels of vegetable matter. In the western states the bones of these animals are generally discovered in the low places around salt licks which are still frequented by the deer and other wild animals that come to suck up the saline waters.—If the alluvium is interesting for these gigantic fossils, it is no less so for the microscopic forms of vegetable and animal life, which, though invisible to the eye, yet by the immensity of their numbers exceed in aggregate bulk that of all the mastodons and mammoths that have ever lived. The silicious deposit, resembling fine white marl, found underlying peat, and at the bottoms of ponds and marshes, especially in a region of primary rocks—a substance often used as a polishing powder—is found on examination by the microscope to consist of the remains of diatoms and desmids.—As these vegetables secrete from the primary rock its principal ingredient, so testaceous animals secrete from the limestone the calcareous matter for their shelly coverings; and of their remains are made up the marl beds and other beds of alluvium that abound in shells, as the oyster banks and muscle beds of our coast. The lime of which the latter is composed is no doubt mostly abstracted from that held in solution in sea water. But salt water, fresh water, and land shells all flourish best where limestone rocks abound; and where this source of lime is deficient, they even acquire the materials of their own shells from the remains of former individuals. The accumulations of this nature going on in our ponds, lakes, and harbors, though now little apparent to observation, are a part of the alluvial formation that will have an important bearing in the future economy of our globe, as the similar formations of previous epochs have in the present period. And the same remark may be extended to peat, beds of which are found rivalling, in the quantity of carbonaceous matter they contain, the beds of fossil fuel, into which they too will in time be converted.—The most interesting feature of the alluvium, which has been already incidentally alluded to, is its being the only geological formation which contains human relics and remains. In no other formations are they found, or ever will be; for the races of animals and plants that have lived at different periods have not failed to leave permanent records of their most delicate organizations, and in the rocks of a very different epoch are still to be seen the footmarks left by strange forms of birds. Thus man and his works characterize the rocks of this period, as the gigantic birds characterize the new red sandstone, and the great saurians the formations from the lias to the chalk.—The alluvial deposits produce our most fertile lands. The clays are the materials of our houses and household utensils. The sands are used for many purposes in the mechanical arts. Bog iron ores collect in low marshy places from the filtration of water through older formations, in which ferruginous matters of various forms are diffused. The water dissolves the oxide of iron and conveys it away, as it dissolves the potash from ashes through which it leaches. It gathers the scattered materials of the ore together, and as it evaporates leaves them in form suitable for use. As the ores are removed, more collect and renew the supply; so that they are believed by many, who do not comprehend the manner of their silent accumulation, to be endowed with a principle of growth analogous to that possessed by organic bodies: a belief which, after all, may not in one sense be so very extravagant; for according to the researches of Ehrenberg, the ochreous particles, under the microscope, prove to be portions of an organic body of extreme minuteness, which is now believed to be a plant.

ALMA, a small river in the Crimea, running from the high ground in the neighborhood of Bakhtchisarai in a westerly direction to Kalamita bay, between Eupatoria (or Kozlov) and Sebastopol. The southern bank of this river was selected during the Crimean war by Prince Mentchikoff, the Russian commander, as a defensive position in which to receive the onset of the allied armies just landed in the peninsula. The battle was fought Sept. 20, 1854, and resulted in a victory of the allies and the opening of the road to Sebastopol. The Russian force numbered 35,000 men with 96 guns; the English, under Lord Raglan, 28,000 men with 24 guns; the French, under St. Arnaud, 28,000 men and 72 guns; and the Turks, 6,000 men.

ALMACK'S, a suite of assembly rooms situated at No. 26 King street, St. James's, London, so called after Almack, a tavern-keeper, whose original name was M'Call, and who founded the establishment in 1765. They are now called Willis's rooms after Frederick and Charles Willis. Here take place concerts, charity balls, and select public meetings. The annual balls, however, which are held during the season, constitute the chief claim to the prominence of Almack's. They are managed by a committee of ladies, and the only mode of admission is by vouchers or personal introduction. The exclusiveness of the lady patronesses, great as it is now, was incomparably greater at the time of the opening of the rooms. Down to about 1830 Almack's retained a great deal of its ancient prestige, but since that time it has been gradually declining.—The name of Almack's has been given to similar places of entertainment in European watering places. A gambling club of the same name, opened under the auspices of the same proprietor in Thatched House tavern, 85 St. James's street, was rather notorious toward the end of the 18th century, the play there having been deeper than either at White's or Brookes's. Before Brookes's club house was built, the whig party used to meet at Almack's, where a regular book was kept of the wagers laid by the different members. The following are specimens: "March 11, 1775. Lord Bolingbroke gives a guinea to Mr. Charles Fox, and is to receive 1,000 from him whenever the debt of this country amounts to £171,000,000 sterling. Mr. Fox is not to pay the £1,000 till he is one of his majesty's cabinet." "Aug. 7, 1792. Mr. Sheridan bets Lord Lauderdale and Lord Thanet 25 guineas each, that parliament will not consent to any more lotteries after the present one, to be drawn in February next."

ALMADEN, or **Almaden del Azogue** (the mine of quicksilver), a town of Spain, in the province of Ciudad Real, about 50 m. N. of Córdova; pop. about 9,000. It is simply one long street, built on a ridge of quartz rock, which is rich in cinnabar. The quicksilver mines here are perhaps the richest and most ancient in the world. They were wrought by the Romans, who had a town here called Sisapona Cetobrix. In the 16th century the Fuggers of Augsburg rented the mines and worked them for some years. They were subsequently operated by the Spanish government, and until the early part of the present century the laborers were all convicts, but free persons are now employed. The product of the mines is delivered at Seville, and since 1836 has been by contract monopolized by the house of Rothschild. The principal mine is directly under the town, and the great adit is close to the houses, the ascent and descent for the men being by ladders, while the mineral is drawn up a stone shaft by mules. The depth of the workings is about 1,000 feet, and the cinnabar is found in three principal veins several feet thick. The lowest portions of the mine are the richest. Virgin quicksilver is found in pyrites and hornstein and in a grayish conglomerate, and in some places may be seen running down the face of the rock. The galleries and permanent works are all splendidly built of stone, and there are extensive storehouses and manufactories of everything needed for carrying on the operations of the mine. The annual yield of quicksilver is from 15,000 to 25,000 quintals, though the proportion of mercury to the ore is only about 10 per cent.; and the mines are apparently inexhaustible. There is a smaller mine near the principal one, and another, called Almadenejos, or Little Almaden, about five miles distant. The number of hands employed is about 4,000. They work day and night during the winter, and in summer the mines are closed, the heat then rendering the mercurial exhalations too dangerous. The miners suffer a great deal from salivation and paralytic affections, but the summer's rest generally restores their health. The government derives an annual profit of about $1,250,000 from the mines. A practical mining school has been established in the town.

ALMAGEST (Arab. *al*, the, and Gr. *μεγίστη*, greatest), a name given by the Arabians to Ptolemy's compend (*σύνταξις*) of astronomy, written at Alexandria in the 2d century, translated from Greek into Arabic in the 9th, and translated from Arabic into Latin in the 13th. A better Latin translation from the original Greek was published at Basel in 1541. The Greek text with a French translation was published at Paris in 4 vols. (1813–'28).

ALMAGRO, a city of Spain, in the province and 12 m. E. S. E. of Ciudad Real; pop. about 11,000. It is celebrated for its laces, in the manufacture of which thousands of women are engaged in the town and its vicinity. Almagro was founded in 1214 by Archbishop Roderic of Toledo.

ALMAGRO, Diego de. **I.** One of the associates of Pizarro in the conquest of Peru, born of unknown parents about 1464, and picked up as a foundling near the Spanish town from which he derived his name, died in 1538. He had acquired both wealth and fame in the new world, when he joined Pizarro at Panama in the attempt to conquer the flourishing kingdom of the incas. In the division of offices among the leaders of the enterprise, Almagro was appointed to manage the forwarding of supplies of men and provisions, in which he had to contend with many formidable obstacles, but overcame them all. From the time of the first landing of the Spanish forces until the death of Atahuallpa, Almagro was engaged in repeated quarrels with Pizarro, whom he accused of treachery in depriving him of his just share in the fruits of their conquests. He finally attempted to seize Cuzco, the capital, but was persuaded by Pizarro to undertake instead the reduction of Chili, of which kingdom he was to have the undivided control. In 1535 he set forth with 570 European followers, and underwent great hardships among the mountains. The natives resisted him bravely, but he had made some progress when a rising of the Peruvians, who had attacked Lima and Cuzco, summoned him home. Returning by a toilsome march along the coast, he defeated the natives, and took possession of Cuzco, which he resolved to hold. A civil war ensued, in which Almagro neglected to avail himself of his advantages until Pizarro, having gained time to recruit his forces by negotiation, marched to Cuzco with 500 men, and, defeating him in a bloody engagement, took him prisoner. After several months of confinement, he was tried, condemned, and strangled. He was a man of frank and winning manners, and far more popular among his men than Pizarro. He had never learned to read and write. **II.** The son of the preceding by a Peruvian woman, was a brave, generous, and accomplished youth; his father, mindful of his own deficiencies, having spared no pains in his education. He became the leader of the party opposed to Pizarro upon the death of the elder Almagro, and, after the assassination of the governor, was proclaimed his father's successor. He enjoyed authority for a very brief season, however, as Vaca de Castro soon arrived, bearing a royal commission as governor. Almagro attempted to resist him, and on Sept. 16, 1542, a sanguinary engagement took place between the forces of the rival leaders, in which the victory remained with his opponent. Almagro escaped after the battle, but was given up by his own officers, and beheaded at Cuzco.

ALMALI, or **Elmalu**, a city of Turkey, in Asia Minor, 40 m. W. S. W. of Adalia; pop. about 12,000. It lies in a beautiful valley among the northern offshoots of the Lycian range of the Taurus. The small stream on which the town is built furnishes motive power for numerous mills, and is also used in several tanneries, dye works, and factories.

AL-MAMOUN, Abu Abbas Abdallah, an Abbasside caliph, son of Haroun-al-Rashid, reigned from 813 to 833. After the death of his father in 809 he contested the throne with his brother Al-Amin, who was killed. He converted his chief towns into seats of learning. Various works were translated from Greek and Sanskrit. Algebra and arithmetic were borrowed from the Hindoos, astronomy from the natives of the plains of Mesopotamia, and logic, natural history, and the Aristotelian system from the Greeks of the lower empire. In his wars Al-Mamoun was less successful, and the disintegration of the caliphate by the establishment of independent states in parts remote from the centre, which was begun in the preceding reigns, became more disastrous in his. He was succeeded by his brother Al-Motassem, under whose reign the Seljuks first became body guards of the caliphs, whose empire they were in time to usurp.

ALMANAC (probably from the Arabic *al-manah*, the reckoning), a publication of the calendar, generally containing chronological records of religious festivals and memorable events, and astronomical data, as well as miscellaneous information. Tables representing almanacs were first used by the Arabs mainly as astronomical guides, and from them became known among the Alexandrian Greeks and in Europe. Manuscripts of some of those of the middle ages are preserved in various English and continental libraries. An almanac for 1836 was printed recently from a manuscript prepared in 1300 by Petrus of Dacia, containing chaotic astronomical, chronological, and medical data. The British museum and Corpus Christi college, Cambridge, preserve manuscript almanacs of the 14th century. The earliest printed almanac is believed to have been that of the German astronomer Purbach (Vienna, 1457). His pupil Regiomontanus published toward the end of the 15th century, under the auspices of the Hungarian king Matthias Corvinus, several numbers of a *Kalendarium Novum*, in German and Latin. "The Kalendayr of the Shyppars," or "Shepherds' Calendar," an English translation of a French work, was published in Paris in 1497. Every month is introduced with a fragment of doggerel verses. The following is a specimen of its contents:

> "Saturne is hyest and coldest, being full old,
> And Mars with his bluddy swerde ever ready to kyll.
> Sol and Luna is half good and half ill."

New editions of this almanac were published in the early part of the 16th century. The chief attractions of these and subsequent annual publications were prognostications of the weather and fortune-telling, and they became highly popular. Paynter's burlesque, "Four Great Syers" (about 1560), was followed in 1609 by Thomas Dekker's "Raven's Almanacke," and in 1618 by Laurence Lisle's "Owle's Almanack." "Poor Robin's Almanack," the most famous of them all, was begun in 1663. Under James I. almanacs were monopolized by the universities and the stationers' company, astrology and superstition being their principal ingredients. Francis Moore's *Vox Stellarum* led the way in advertising quack medicines. "Poor Robin's Almanack" flourished until the monopoly of the stationers' company was broken up in 1775. An attempt for its renewal, made by Lord North in parliament, was baffled by Erskine's argument against it (1779), but the company nevertheless endeavored to retain the monopoly by buying up rival publications. "The Ladies' Diary," established in 1794, was of a better kind; but it was not until after the issue of the "British Almanac" (1828) that the stationers' company purged their "New Englishman's Almanac" of obnoxious matter.—In France, Rabelais made an ineffectual attempt to destroy the popular faith in the astrological predictions of almanacs. Nostradamus (1550–'66) made prophecies popular to such an extent that political predictions in almanacs were prohibited by the French authorities on several occasions. Matthieu Laensbergh, a citizen of Liége of the 17th century, was the founder of the *Almanach liégeois*, printed under the name of Lansbert in 1625, and since 1647 under that of Laensbergh. It contained information about the planets, absurd medical prescriptions, and notices of religious holidays and historical events, and attained great popularity by predictions of weather and occurrences. An occasional hit, as for instance that of the predicted downfall of Mme. du Barry in consequence of the death of Louis XV., confirmed the credulous in their confidence in the almanac. At first it was also made convenient to the illiterate by the adoption of signs indicative of dates in place of letters. In 1823 the Netherlands authorities used repressive measures against the almanac on account of the objectionable political allusions, and its circulation was more seriously checked in 1852 by the French government. Since the year 1625 a calendar for shepherds (*Calendrier des bergers*) has been included in each annual almanac. Various spurious *Almanachs liégeois* are published in France, as for instance the *Triple véritable almanach de Liége*. Matthieu Laensbergh, the original founder, is still so popular in Belgium and France that from 1824 to 1829 a daily journal of Liége bore his name as a title, and he figures as the hero in a recent French comedy. Though modern works have in a great measure superseded these almanacs, the peasantry all over Europe still retain a great partiality for them. The *Almanach impérial* (since 1871 *national*) and *Almanach de France*, and the *Annuaire-Almanach du commerce* (published by Didot Jan. 1, 1872), are the leading French almanacs. Many almanacs are at the present day published in France under the title of *Annuaires*, or *Annuaires-Almanachs*. On the other hand, literary annuals and albums are published in France, Germany, and other countries under the title of almanacs, as for instance the German *Musenalmanach*, and the French *Almanach des muses*. Germany originated these annual collections about 1815, and they circulate there more extensively than the ordinary almanacs do in other European countries. A little Breton Almanac for 1872, *Almanak Breiz-Izel*, prepared by some of the best Celtic scholars in France, contains, besides agricultural, veterinary, philological, political, and historical lore, some popular tales, proverbs, patriotic poems, &c. The *Almanach de Gotha* is published both in French and German by Justus Perthes, at Gotha, Germany, and is (1873) in its 110th year. It is a high authority on the genealogy of sovereign and princely families, and statistics and official information respecting the different countries of the world. —Nautical almanacs, containing astronomical information designed to aid in the determination of latitude and longitude at sea, &c., have been published in France since 1679, and in Germany since 1776, under the respective titles of *Annuaires* and *Jahrbücher* or *Annalen*, and in England since 1767. The "American Nautical Almanac" was founded by Admiral Charles Henry Davis, U. S. N., who was appointed its first superintendent in 1849. The first volume, for 1855, was published in 1853.—The first ordinary American almanac is believed to have been issued from the press of William Bradford in Philadelphia in 1687. Franklin's celebrated "Poor Richard's Almanac," first published by him in 1732, and continued about 25 years, became very popular in this country as well as in England and France, where its proverbial and wise utterances were reprinted and translated. The "American Almanac and Repository of Useful Knowledge" was published at Boston from 1828 to 1861. The "National Almanac," designed as a continuation of the above, was published at Philadelphia for 1863 and 1864 only. There are now upward of 100 almanacs published in the United States, a number of them being illustrated, relating to almost all imaginable subjects of desirable information for all classes and occupations, and also including comic almanacs as well as versions in foreign languages, chiefly in German.

AL-MANSOUR, Abu Jaffar Abdallah, the second Abbasside caliph, born about 712, died Oct. 18, 775. He succeeded his brother Abul Abbas in 754. On his accession the sovereignty was claimed by Abdallah, his uncle. Abdallah, however, was completely defeated by Al-Mansour's lieutenant, Abu Moslem, who was soon after put to death for declining to serve as governor of Egypt. Nor was this the only instance of Al-Mansour's cruelty. In 758 Cufa, then the residence of the caliphs, was the scene of a riot got up by the Ravendites, a sect who believed in metempsychosis. This so displeased Al-Mansour that he founded Bagdad, to which city the seat of government was removed. His reign was again disturbed by a revolt of the descendants of Ali ben Abu Taleb, which was suppressed. His arms were victorious in Asia Minor, Armenia, and further east. Spain, however, was lost to the caliphate of Bagdad during his reign. He was the first of the caliphs who introduced the taste for literature. In his reign many of the best Greek works were translated into Arabic.

ALMARIC or **Amalric of Bène,** or **Amaury of Chartres,** a French theologian and philosopher, born at Bène near Chartres, died about 1209. He was one of the most celebrated teachers of dialectics and the arts in the university of Paris, and devoted himself especially to the study of Aristotle, from whose writings he drew the germ of his own philosophical system. He taught that God was an immaterial substance, without form or figure, but with perpetual and necessary movement. All beings were derived from this primitive substance and would finally be absorbed in it. There were three epochs in the religious history of the world: the Mosaic law marked the epoch of God the Father; the gospel period was the epoch of God the Son, in which every man was a member of Jesus Christ, whose body was in everything as well as in the eucharist; the epoch of God the Holy Ghost was then about to begin, in which the sacraments were to cease and men to be saved by the interior infusion of the Spirit without the need of any external act. The work entitled *Physion* (now lost), in which Almaric explained this theory, was condemned by Innocent III., and the author was obliged to recant in 1204. His disciples exaggerated his errors, teaching that God the Father was incarnate in Abraham. They denounced the pope as Antichrist, and are accused of gross immorality. One of them, a goldsmith named Guillaume, announced himself as one of the seven personages in whom the Holy Ghost was to become incarnate, and pretended to the gift of prophecy. A synod held at Paris in 1209 sentenced Guillaume and nine others to the flames, and the corpse of Almaric was exhumed and burnt with his books.

ALMEH (properly *alimeh*, pl. *awalim*), an Arabic name given to the better class of public singers and dancers in Egypt, and sometimes erroneously applied also to the lower prostitutes and dancers, the ghawazi. The almehs form a separate social class, live together in companies, and often earn very large sums by their songs, dances, and improvisations, which are almost always of a lascivious character. Their services are generally called into requisition at banquets, marriages, and other festivals.—The ghawazi are a much lower class, including both male and female dancers, who travel from place to place, and exhibit in the public streets their dances, which, like those of the almehs, consist of lascivious movements of the body. The female ghawazi are prostitutes of the lowest class; yet a respectable Arab may without disgrace marry one of them who has abandoned her profession. Though the two classes are alike in the licentiousness of their lives and occupations, a sharp distinction exists between the almehs and the ghawazi, the former pandering to the higher orders of society, while the latter (considered by many actually a distinct race of gypsies) address themselves to the populace.

ALMEIDA, a strongly fortified town of Portugal, in the province of Beira, near the Spanish frontier, 20 m. W. of Ciudad Rodrigo, on the river Coa; pop. about 8,000. One of the foremost strongholds of the kingdom, it was taken by the Spaniards in 1762, and by the French in 1810. When in 1811 Wellington compelled the retreat of the French from Portugal, the latter destroyed a large part of the fortifications, but these were soon restored by the British. In 1844 the insurrectionists, under Bomfim, held Almeida a few weeks against the troops of the queen.

ALMEIDA, Francisco de, the first Portuguese viceroy of India, born about the middle of the 15th century, died March 1, 1510. He distinguished himself in the peninsular wars with the Moors, and on his appointment to the government of the newly discovered Indian provinces, in 1505, was attended by a large number of volunteers. He extended the Portuguese power, but was unfortunate in an expedition against Calicut, losing his son Lorenzo and a part of his fleet. At this juncture Albuquerque came out to India, but Almeida refused to recognize him, and cast him into prison until he had avenged the death of his son, ravaged the coast, and destroyed a fleet of the sultan of Egypt, who was the ally of the king of Calicut. He then laid down his government, and sailed for home, but was killed by the natives at Saldanha bay, near the Cape of Good Hope.

ALMERÍA. I. A S. E. province of Spain, in Andalusia, on the Mediterranean; area, 3,299 sq. m.; pop. in 1867 (estimated), 352,946. The greater part of the province is broken by mountains and ravines, with small valleys and plateaux, nearly denuded of wood and subject to great extremes of drought and flood. There are very few roads and no public improvements. But it is one of the richest provinces of Spain in mines of silver, lead, copper, coal, salt, &c., which are worked in the most primitive manner, mining being the chief industry. There is little agriculture, but some grain and silk are produced, and cotton is raised to some extent along the coast, its cultivation having been introduced by Mr. Kirkpatrick, U. S. consul at Málaga, many years ago. The principal towns, besides the capital, are Vera, Purchena, Sorbas, and Berja. **II.** A city and the capital of the preceding province, situated on the Mediterranean, 104 m. E. of Málaga; pop. about 30,000. It was one of the most important commercial towns of Granada in the time of the Moorish kings, is still surrounded by the old Moorish walls, and has in general an African aspect. It was formerly the principal port of the coast, and at one time a notorious seat of pirates. The principal building is a magnificent cathedral.

ALMODOVAR, Ildefonso Diaz de Ribera, count of, a Spanish statesman, born about 1777, died in

January, 1846. On the fall of the constitution in 1823 he retired into France, whence he returned on the invitation of the regent Christina, was chosen president of the popular branch of the cortes, and in 1835 was appointed captain general of Valencia, where he ruled with great severity. Under Mendizabal he was successively minister of war and minister of foreign affairs, and the latter position he held also under Espartero in 1842–'3. In 1837 he was appointed senator.

ALMOHADES, a Moslem dynasty of northern Africa and Spain, which reigned in the latter half of the 12th century and in the earlier half of the 13th. The term is an abbreviation of Al-Mowahedun, which means the Unitarians. The origin of their power is traced to a certain Mohammed, or, with his full name, Abu Abdillah Mohammed ben Yumert, who travelled to Córdova for education, and thence to Cairo and Bagdad to complete his studies. On his return from the east, Mohammed became conspicuous by the austerity of his life and the boldness of his preaching. He was made tutor of Abd-el-Mumen, a youth of high birth, whose mind he filled with a belief that he was reserved to inaugurate a purified Moslem creed. At Morocco he took up his abode in a burial ground, where he preached to the people the coming of the great Mahdi (director), who was to establish the reign of universal justice and peace upon the earth. One day as he was thus preaching, Abd-el-Mumen remarked, "You are yourself the great Mahdi," and immediately swore allegiance to him, in which he was followed by 50, and soon after by 70 others. They retreated to the mountains, preaching the unity of God, and soon their number was swelled to 20,000; and a victory over the king's brother established the influence of the Almohades. The war was kept up against them with varying success, but about 1130 they marched against Morocco, and obtained a complete victory. The Mahdi now summoned his followers, and, announcing his approaching departure, laid down his power, and was said to have been translated. Abd-el-Mumen was then elected sovereign. He overran Oran and Fez, and about 1147 reduced Morocco, the last refuge of the Almoravides, to extremities. After a desperate defence, the city was taken, and Abd-el-Mumen massacred the inhabitants and razed the town. In Spain the Almohades were equally successful. The Almoravides were defeated at every point. Abd-el-Mumen proclaimed a holy war, but died in the midst of his preparations, in 1163. His son Yusuf succeeded, at the age of about 24, and reigned until about 1184, when he died, while besieging Santarem in Portugal.—Yacub ibn Yusuf or Al-Mansour, his successor, carried on the war against the Christians, and in 1195 defeated Alfonso VIII. of Castile at Alarcos. He died in Africa in 1199. Mohammed Abu-Abdallah, his son, succeeded him. He levied a vast army against the Christians. Pope Innocent III. having authorized a crusade, the clergy exerted themselves to repel the invasion; and on June 12, 1212, the battle of Navas de Tolosa was fought, in which Mohammed barely escaped with life, leaving, it is said, 170,000 dead on the field. He returned to Morocco, and resigning his crown to his son Yusuf Abu-Yacub, who was only 11 years old, died in 1213. With the latter prince, who died childless in 1223, the direct Almohade line terminated. Al-Adel and Al-Mamoun, both nearly related to Abu-Yacub, held for a time the empire of the Almohades, but it was soon torn asunder by internal divisions, and shortly after the middle of the 13th century disappeared.

ALMON, John, an English political writer, born in Liverpool in 1738, died Dec. 12, 1805. In 1759 he established himself as a bookseller in London. On the death of George II. he published a review of his reign, after which he published a "Review of the Administration of Mr. Pitt," besides "Anecdotes of Lord Chatham" (3 vols. 8vo), "Biographical Anecdotes of Eminent Persons" (3 vols.), and an edition of "Junius" (2 vols.), in which he attempted to prove that Hugh Boyd was Junius. He put his pen and press at the disposal of John Wilkes, and published a pamphlet on "Jurymen and Libellers," for which he was tried, but acquitted. He was also arraigned for selling copies of Junius's letter to the king, compelled to pay a fine, and to find bail to keep the peace for two years. He was the publisher of Wilkes's "North Briton," and wrote his life. In 1774 he established the "Parliamentary Register." He also compiled "The Remembrancer, or Impartial Repository of Public Events from 1775 to 1784" (17 vols. 8vo, and a prior volume relating to American affairs). In his latter years he became proprietor and editor of the "General Advertiser."

ALMOND (*amygdalus*), a genus of plants, the type of the sub-order *amygdaleæ*, comprehending the almond, plum, peach, cherry, nectarine, and a few unimportant bushes of a somewhat

Almond—Fruit, Flower, Leaves, and Nut.

gay appearance. The common almond (*A. communis*) is a native of Barbary, but has long been cultivated in the south of Europe and the temperate parts of Asia. The fruit is produced in very large quantities, and exported into northern countries. It is also pressed for oil, and used for various domestic purposes. There are numerous varieties of this species, but the two chief kinds are the bitter almond and the sweet almond. The sweet almond affords a favorite article for dessert, but it contains little nourishment, and, of all nuts, is one of the most difficult of digestion. The highly prized Jordan almonds are brought from Málaga. The tree has been cultivated in England for about three centuries, for the sake of its beautiful foliage, as the fruit will not ripen without a greater degree of heat than is found in that climate. The bitter almond contains less fixed oil than the sweet almond. It has a strong narcotic power, derived from the presence of hydrocyanic (prussic) acid, and is said to act as a poison on dogs and some other of the smaller animals. The distilled water of the bitter almond is highly injurious to the human species, and when taken in a large dose produces almost instant death. The leaves of all the varieties of *amygdaleæ* contain hydrocyanic acid, and are often dangerous, while the fruit may be used with entire impunity.

ALMONDE, Philippus van, a Dutch vice admiral, born at Briel in 1646, died near Leyden, Jan. 6, 1711. He served under Admiral Ruyter in the memorable sea fights of July, 1666; and after Ruyter's death, at Syracuse, Sicily, in 1676, the duty of taking the command of the Dutch fleet on its way home from the Mediterranean devolved upon him. He covered himself with glory at the battle of La Hogue in 1692, and assisted Cornelius van Tromp in reducing the naval power of Sweden.

ALMONER (anciently written *amner*), an officer appointed to distribute alms to the needy, generally an ecclesiastic. Such officers were from very early times in Europe attached to the households of sovereigns, nobles, and prelates, to monastic, educational, and charitable institutions, &c. In England there was a lord high almoner before the time of Edward I., and in modern times the title has been held by the archbishop of York. There is also a hereditary grand almoner in the person of the marquis of Exeter; and there is an almonry in Westminster. In France the *grand aumônier* was the chief ecclesiastic of the king's household, generally of high birth, and had several subordinates with great power and peculiar privileges. Since 1792 the office has been several times abolished and restored; it existed under Napoleon I. (Cardinal Fesch) and III. There are also almoners of the army and navy, &c. In the church, deacons have sometimes been called almoners (*eleemosynarii*).

ALMONTE, Juan Nepomuceno, a Mexican general and diplomatist, born in Valladolid in 1804, died in Paris, March 22, 1869. He was of partly Indian origin and the reputed son of Morelos. He held diplomatic posts at various times in Washington, London, Lima, and Paris. With Santa Anna, on whose staff he was then serving, he was captured by Gen. Houston at the battle of San Jacinto in 1836. Released after six months, he became minister of war under Bustamente. During the war with the United States he fought under Santa Anna, with whom he never ceased to hold friendly relations. He was ambassador to Paris in 1857–'60, and was one of the principal instigators of the French invasion of Mexico and the election of Maximilian. With the assistance of the imperial forces, he was appointed dictator of Mexico in 1862; but all parties distrusted him, and the French themselves removed him in September of the same year. In June, 1863, he was president of a junta styled the regency of the Mexican empire. In 1864 Maximilian conferred upon him the titles of regent and grand marshal, and in 1866 sent him as ambassador to Paris, where he spent the rest of his life.

ALMORA, a town of N. India, capital of the British district of Kumaon, Northwestern Provinces, situated among the Himalayas, 5,337 feet above the sea level, 90 m. N. by E. of Bareilly. It is built along a mountain ridge, in the midst of a barren and desolate region, and approached by a single long, zigzag road. It was captured by the Gorkhas in 1790, and held till 1815, when the town was attacked and stormed on the 25th of April by the British forces under Col. Nicholls, after which the district was annexed to the British territory.

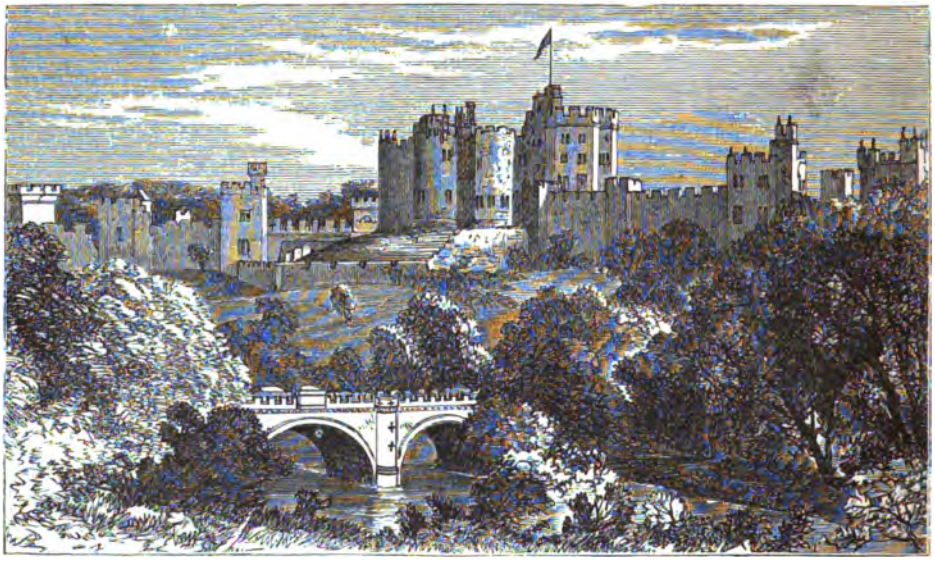
ALMORAVIDES, a Moslem dynasty in N. Africa and Spain, which owed its origin to Abdallah ibn Yasim, who preached Islam among the Arabian tribes of northern Morocco, became the chieftain of the Al-Murabathin (the devoted, hence the word Marabout), and died in battle about A. D. 1058. Abubekr ibn Omar succeeded him, but during his absence on a warlike expedition, his lieutenant, Yusuf ibn Tashfyn, seized the supreme power. Abubekr, on his return, finding his rival too strong, resigned the crown, and Yusuf acknowledged his forbearance by magnificent presents, which he repeated annually during Abubekr's life. Yusuf now founded the city and empire of Morocco. Invited to Spain by the Moorish prince of Seville to aid him against the Christians, he sent an embassy to Alfonso of Castile announcing his arrival in the peninsula, and summoning that monarch to an unconditional surrender, and to embrace Mohammedanism. A desperate battle was fought in the plains of Zalaca in 1086, in which the Christians were worsted. Yusuf, however, retired, but the following year returned, conquered the Moorish kings in detail, and, having proclaimed his son as his successor, retired to Morocco, where he died in 1106. About 40 years later the dynasty of the Almoravides was overthrown by the Almohades.

ALMQUIST, Karl Jonas Ludvig, a Swedish author, born in 1793, died in Bremen, Oct. 26,

1866. He studied theology, and was for some time a teacher. Besides miscellaneous works, he published novels and poetry, including *Törnrosens Bok* ("Book of the Rose"). Implicated in a case of poisoning in 1851, he fled to the United States, but went to Bremen in 1865. His works are very popular in Germany, where most of them have been translated.

ALMY, William, an American philanthropist, born Feb. 17, 1761, died Feb. 5, 1836. He belonged to the society of Friends, and was a public teacher. Having made a fortune in partnership with his brother-in-law, Obadiah Brown, in manufacturing cotton goods, he devoted a large share of his wealth to charitable works, especially in Providence, R. I., where he lived. He endowed the New England yearly meeting boarding school at Providence, and paid for the education of 80 of its pupils.

ALNWICK, the county town of Northumberland, England, on the river Alne, 30 m. N. of Newcastle; pop. about 8,000. It is well built, chiefly of stone, with broad, well paved streets, lighted with gas. It has a fine town hall, and a large square where weekly markets are held. The ancient castle of the same name, N. W. of the town, the residence of the duke of Northumberland, covers five acres of ground, and was restored in 1830 at an outlay of £200,000. It is built of freestone, in the Gothic style, and is one of the finest old baronial residences in England. Alnwick castle formed one of the strongest bulwarks against the incursions of the Scots in ancient times, and was repeatedly besieged by them. Near its walls Malcolm III. of Scotland was slain in 1093, and his army routed; and in 1174 William the Lion was defeated here at the head of a large army, and taken captive.



Alnwick Castle.

ALOE, a genus of succulent plants belonging to the natural order *liliaceæ* and tribe *asphodeleæ*, with long, fleshy, narrow, toothed leaves, growing in tropical countries. It has been divided into a variety of species, consisting of trees, shrubs, and evergreen herbaceous plants, which differ in height from a few inches to upward of 30 feet, and no less widely in the character of their leaves and flowers. A large proportion of these different species have no medicinal properties, but are seen as objects of curiosity, in collections of succulent plants; while a few species are highly valued for the juice of their leaves, which forms the aloes of commerce. (See Aloes.)

ALOE, American. See Agave.

ALOES, the inspissated juice of the leaves of different species of aloe. Several varieties are known in commerce, some much superior in quality to others. Cape aloes, obtained from the *aloë spicata*, growing at the Cape of Good Hope, occurs in masses of a shining dark olive-green color, of a vitreous fracture, and translucent at the edges; the powder is of a greenish yellow color, with a very disagreeable odor and intensely bitter taste. Barbadoes aloes is prepared in the West Indies, and is the product chiefly of the *A. vulgaris*. The color is a dark brown, not shining, and the odor is unpleasant. Socotrine aloes, from the *A. Socotrina*, occurs in pieces of a yellowish brown color, less shining than the Cape aloes; the fracture is conchoidal, the odor aromatic, and the taste very bitter. This is much the most valuable variety, and the name is applied to parcels of aloes of good quality coming from other sources than the island of Socotra.

Hepatic aloes, known in India as Bombay aloes, has a dark liver color, and is probably an inferior kind of drug, manufactured from the dregs of other sorts.—Aloes contains a neutral bitter principle called aloine, which acts as a cathartic in the dose of from one half to one or two grains, and insoluble matter called apotheme. It yields its virtues to water and alcohol, and is often administered, in its natural form or in combination with other substances, in pills. It is an irritant purgative, slow in operation, and acting chiefly on the lower bowel and the rectum. A peculiarity of its action is that an increase of the quantity administered, beyond the medium dose, is not attended with a corresponding increase of effect. When used for a long time, the dose may be rather diminished than increased. It is rarely used alone, but is combined with soap, rhubarb, colocynth, and iron in substance and in tincture. It forms an ingredient of a great number of empirical preparations. From 2 to 5 grains form a laxative dose; from 5 to 10 grains, a strong purgative. It is supposed to produce or irritate piles. Its tendency is to produce congestion of other pelvic organs, and it is therefore sometimes used as an emmenagogue.—The processes of preparing the drug are various. Sometimes the leaves are cut off at the stem, then cut in pieces, and the juice drained off in iron vessels. It is then suffered to stand for 48 hours, during which time the dregs are deposited, and the remaining portion is poured off into broad flat vessels, and becomes inspissated. In other places, the leaves are pulled, and after being cut in pieces, the juice is extracted by pressure. —The aloes or lign aloes (*i. e.*, wood aloes, Lat. *lignum*) mentioned in the Bible as a perfume was an entirely different substance. It was probably the product of the *aquilaria agallochum* of tropical Asia, which yields the highly aromatic aloe wood or eagle wood of commerce. There are many other species, the wood of which, like that of the preceding, is rendered more or less resinous and odoriferous by decay, with a bitter quality which gives it the name of aloes.

ALOIDÆ, in classical mythology, the gigantic sons of Neptune by the wife of Aloëus. Their names were Otus and Ephialtes. At the age of 9 their bodies measured 9 cubits in breadth and 27 in height, and they alarmed the gods by waging war on Olympus and piling Pelion upon Ossa. They put Mars in chains and kept him so 13 months. Before their beards began to grow Apollo destroyed them.

ALOMPRA, the founder of the reigning dynasty of Burmah, born about 1710, died May 15, 1760. He was originally chief of a small village. The king of Burmah having been captured and the country conquered by the Peguans, Alompra in 1753 headed an insurrection which, after a series of brilliant victories on his part with inferior means, ended in 1757 with the conquest of Pegu and the establishment of his power over both countries. His reign was short, but was distinguished by great improvements in the laws and administration of government. He founded the city and port of Rangoon.

ALOST, or **Aelst,** a town of Belgium, province of East Flanders, about half way between Brussels and Ghent; pop. in 1866, 18,978. The Dender, an affluent of the Scheldt, which has been made into a canal for the accommodation of trade, passes through the town. It has considerable trade and manufactures, and was formerly the capital of Austrian Flanders. Captured by Turenne in 1667, the town was for a time in the hands of Louis XIV. It is well built and clean. In the church of St. Martin is a picture by Rubens representing "The Plague of Alost."

ALPACA, a species of the genus *lama* of Fr. Cuvier (properly *llama*), and *auchenia* of Illiger, which with the genus *camelus* constitutes the family of *camelidæ*, of the order of *bisulca ruminantia*. The alpaca is found in the mountainous regions of Peru, and subsists on the coarse and scanty forage which grows on the sterile soil of that quarter. The upper part and the sides of the body of this animal are covered with light chestnut-brown wool, which hangs down in slightly curled meshes nearly a foot in length, and is very soft and elastic, almost as fine as that of the Cashmere goat; the face up to the posterior margin of the jaws, and also the legs, have short, smooth hair; from the forehead a stiff silky hair falls down upon the face. The shearing of the wool takes place at irregular times annually or biennially. From 10 to 12 lbs. are obtained from one animal.

ALP ARSLAN (valiant lion), sultan of the Seljukian Turks, born in Turkistan about 1028, assassinated in 1072. He was descended from Seljuk, succeeded his uncle Togrul in 1063, and was also appointed by the caliph as emir-el-omra or commander-in-chief. He conquered Armenia in 1065 and Georgia in 1068, and though repeatedly repulsed by the troops of the Byzantine empress Eudocia, he eventually carried his victorious arms from Antioch to the Black sea. After the capture and death of Eudocia's husband and general, the emperor Romanus Diogenes (1071), he planned an expedition against Turkistan, the cradle of his dynasty, and crossed the Oxus with an immense army; but he was stabbed to death by the governor of the first fortress he captured, whom he had ordered to be executed in revenge for his obstinate defence. Alp Arslan's virtues as a ruler are no less extolled than his courage as a warrior.

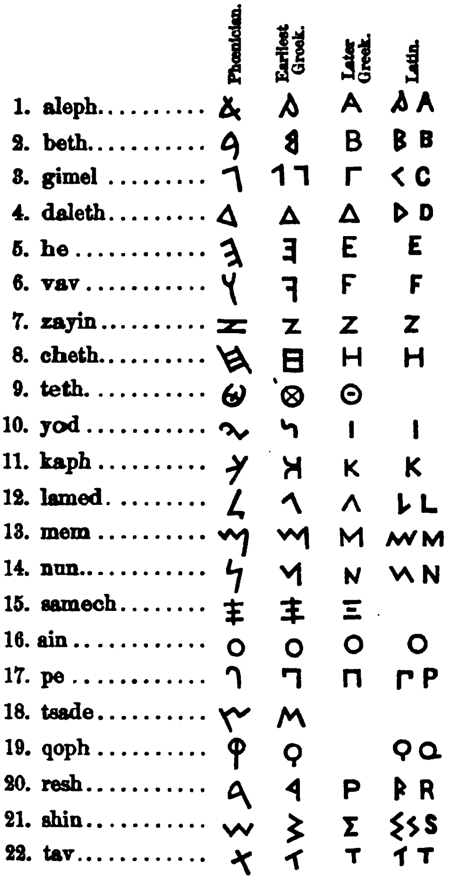
ALPENA, a county of E. N. E. Michigan, on Lake Huron and Thunder bay, drained by Thunder Bay river; area, 700 sq. m.; pop. in 1870, 2,756. In 1870 there were only 319 acres of improved land. Capital, Alpena.

ALPES, Basses and **Hautes.** See BASSES-ALPES, and HAUTES-ALPES.

ALPES-MARITIMES, a S. E. department of France, formed from the circle of Nice, ceded to France by Italy in 1860, and the arrondissement of Grasse, taken from the department of Var; area 1,482 sq. m.; pop. in 1872, 199,037. It lies between the Mediterranean and the mountains from which it takes its name, and is watered by the Var and several smaller streams. The surface is mountainous and crossed by numerous valleys. The climate is the finest in France. The country near the coast is well cultivated, and elsewhere there are valuable forests and various mineral productions. The department is divided into the arrondissements of Nice, Grasse, and Puget-Théniers. The coast is dotted with places naturally or historically interesting, such as Nice, the capital, Cannes, Antibes, and Mentone.

ALPHA AND OMEGA, the first and last letters of the Greek alphabet. The book of Revelation three times designates Jesus Christ by the title Alpha and Omega, perhaps in imitation of Isaiah (xliv. 6), who represents God as saying, "I am the first, and I am the last."

ALPHABET (from the names of the first two Greek letters, *alpha* and *beta*, and therefore the equivalent of our A, B, C), the scheme of signs by which a language is written; as also, less properly, the scheme of articulate sounds expressed by those signs, and constituting by their combinations the spoken language. It is in the former sense only that the word will be understood here; the scheme of articulations—the spoken alphabet, as it may be termed—will be treated, in its character and relations, under the head of PHONETICS. All alphabets are not of the same kind. The intent of such a one as the Greek, the Latin, and our own, is to furnish a sign for every articulate sound of the spoken language, whether vowel or consonant; and its ideal is realized when there are practically just as many written characters as sounds, and each has its own unvarying value, so that the written language is an accurate and unambiguous reflection of the spoken. This state of things is not wont to prevail continuously in any given language; for, in the history of a literary language, the words change their mode of utterance, or their spoken form, while their mode of spelling, or their written form, remains unaltered, or is not correspondingly altered; so that the spelling comes to be "historical" instead of "phonetic," or to represent former instead of present pronunciation. Such is, to a certain extent, the character of our English spelling; but very incompletely and irregularly, and with intermixture of arbitrarinesses, and even blunders, of every kind; it is an evil that is tolerated, and by many even clung to and extolled, because it is familiar, and a reform would be attended with great difficulties, and productive for a time of yet greater inconvenience.—Some alphabets are syllabic; that is to say, they have a sign for every syllable, composed of a vowel or diphthong and one or more consonants, that enters into the composition of the words of a language: examples are the Cherokee syllabary, invented by Sequoyah or George Guess, containing 85 signs; and the Japanese *irofa*, containing 47 signs. Others, again, are consonantal; that is to say, the consonants are either written alone, the vowels being unexpressed, or only the consonant has a full sign, and the vowel is expressed by a modification of it, or a subsidiary sign attached to it: examples are the Hebrew and Sanskrit alphabets, each having a large number of kindred systems. Then there are modes of writing which are not entitled to be called alphabetic: as the Egyptian or hieroglyphic, in which simple phonetic or alphabetic signs are mingled with syllabic, ideographic, and pictorial; or as the Chinese, in which there is an indivisible sign for each whole (monosyllabic) word, and even to a great extent for each different meaning of a word, so that the written signs are many times more numerous than the spoken words. The origin and historical and theoretic relations of these different modes of representing to the eye the spoken word will be explained in the article WRITING.—The English alphabet is derived from the Latin, the Latin from the Greek, and the Greek from the Phœnician. The origin of the Greek alphabet is reported by the Greeks themselves; and their report is confirmed both by the forms of their characters, and by the names given them: *alpha*, *beta*, *gamma*, *delta*, &c., are the Hebrew *aleph*, *beth*, *gimel*, *daleth*, &c.—appellations which have their correspondents also in the other Semitic alphabets, as the Syriac and Arabic. The Phœnician alphabet, in fact, is the old Semitic alphabet, used by many of the Semitic peoples; itself of unknown origin, it has become the mother of nearly all the prevailing modes of writing in the world. It was a consonantal scheme, composed of 22 signs (see the table on p. 351), representing the following sounds: ' (*aleph*), *b*, *g*, *d*, *h*, *w*, *z*, *'h*, *t̲*, *y*, *k*, *l*, *m*, *n*, *s*, ‛ (*ain*), *p*, *s̲*, *q*, *r*, *sh*, *t*. Of these, *aleph* is rather a theoretical device, a figment to attach the utterance of any desired vowel to; *'h* is a stronger and deeper *h*; *t̲* and *s̲* are different from our ordinary *t* and *s*, as being spoken with greater effort, and with a peculiar articulation (the flat of the tongue, it is said, pressed against the roof of the mouth); *ain* is a very peculiar guttural utterance, wholly unlike anything in our system of sounds. The Greeks took from this scheme, without important change of value, the signs for *b*, *g*, *d*, *w*, *'h*, *k*, *l*, *m*, *n*, *p*, *q*, *r*, *t*; others they altered in sound, converting *ṭ* into the sign for aspirated *t* (*th*, or *theta*), *z* and *s* into signs for double consonants, *ds* (or *zeta*) and *ks* (or *xi*); while they used *ṣ* and *sh* for a time interchangeably as signs for their single sibilant, until the former finally went out of use. But the most important modification carried out by the Greeks was that by which they obtained signs for vowels also: *aleph*, *h*, and *ain*, as being useless to them, they made into *a*, *e* (*epsilon*), and *o* (*omicron*); *y* (*yod*) was turned into *i* (*iota*); and for *u* was invented a new sign, *upsilon*, shaped like our V or Y (the two forms being used at first indifferently). This modification converted the alphabet from a consonantal into one purely and completely phonetic, a perfect instrument of the expression of spoken language. Other additions were of somewhat later date: signs for the aspirate labial (*ph*, or *phi*) and guttural (*kh*, or *chi*) as parallel with the *th* or *theta*, and for the assibilated labial (*ps*, or *psi*) as parallel with the *ds* or *zeta* and *ks* or *xi*, were invented and appended at the end of the scheme; a sign for long *ō* (*omega*) was further added, and H, which had signified the rough breathing or aspiration, was altered in value to a long *ē* (*eta*). Moreover, the *w* or "digamma" went by degrees entirely out of use, as did also the *q* or "koppa," and the two were retained only as numeral signs. Thus the constitution of the Greek alphabet, as we know it, is in all its parts accounted for. The additions and changes went on by degrees, and differently in different parts and colonies of Greece; the final form is that given by the Ionians of Asia Minor, and adopted throughout the whole of Greece about 400 B. C. The Semitic original was always written from right to left; the earliest Greek was written either way, or in different directions in alternate lines (the characters being made to face the other way when written from left to right); finally, the present method became established in universal use.—The form of Greek alphabet from which is derived the Latin was not that one which, as above described, was finally adopted throughout Greece, but differed from it in sundry particulars: the H still had its *h* value; the Q was still used, and was retained by the Latins for writing the *k* sound followed by *u* before another vowel; the character for *w*, or the *digamma*, was also in use, and was applied to represent the (as labial, somewhat kindred) sound *f*, for which the Greek had no sign; and X (as generally on the mainland of Greece and in her western colonies) had the value of *ks*, not of *ch*. The earliest Latin alphabet, then, was A, B, C (pronounced as *g*), D, E, F, Z, H, I, K, L, M, N, O, P, Q, R, S, T, V, X, 21 letters. A Z is found in the earliest monuments, but speedily went out of use, and was about the time of Cicero reintroduced as a foreigner, along with Y (originally the same sign with V, but having now become fixed in Greek usage in this form, and having taken a new value, that of the French *u* or German *ü*), in order to write in Greek words the peculiar Greek sounds of those letters. A very peculiar change in the constitution of the Latin alphabet was made in connection with C, K, and G. The K passed out of customary use about the time of the decemvirs, and was employed only in a small number of words (with occasional occurrence in others), while C, the equivalent of the Greek *gamma*, and originally having the same value, was employed to write both the *g* and *k* sounds—doubtless because these two sounds were in the popular utterance only imperfectly distinguished from one another. And when later (about 300 B. C.), under Greek influence, the careful distinction of the two sounds in writing was resumed, instead of giving C its old value and restoring K to common use, the Romans very strangely continued to the former its *k* value, and made from it by a slight alteration a new sign, G, for the *g* value. The final Latin scheme, after the addition of Y and Z, thus consisted of 23 signs. In it I and J were not distinguished, nor U and V; J and U are merely graphic variations of I and V, and of the same value with the latter; the Romans did not regard the vowel and semivowel values of these two sounds—*i* (that is, *i* in *pique*, or "long *e*," as we call it) and *y* on the one side, *u* (that is, *u* in *rule*, or the long sound of double *o* in *fool*) and *w* on the other—as being sufficiently diverse to need a double designation.—The chief alteration, now, that the Latin alphabet has undergone in being adapted to English use is the establishment of J and U as independent letters with distinct values, by the side of I and V; J having for us the peculiar sound (nearly a compound of *d* with *zh*, or with the *z* sound of *azure*) into which the Latin J or *y* sound has been usually converted, and V being applied to represent the sound into which, in most of the literary languages of modern Europe (as in the later Latin also), the original *w* sound has passed. And then, as final extension, we have, in common with some other European languages, added a "double U"—*i. e.*, VV or W—to represent the *u* semivowel, or *w* sound: this character is of a date no more ancient than the middle ages. By all these various reductions and additions, our alphabet has grown from the original 22 signs of the Phœnician to the present scheme of 26 signs; which, by way of summary, we may distribute into eight classes, as follows: 1, letters inherited from the Phœnicians, and still bearing nearly their Phœnician value, are twelve, namely, B, D, H, K, L, M, N, P, Q, R, S, T; 2, letters originally Phœnician, but having their value changed by the Greeks (in every case but one from consonant to vowel), are five, namely, A, E, I, O, Z; 3, additional letters invented by the Greeks are two, namely, U (=V or Y), X; 4, Phœnician letters entering into the Latin alphabet with changed value are two, namely, C, F; 5, of Latin invention is a single letter, G; 6, imported from Greek into Latin in differentiated form and with later Greek value is one, Y; 7, varying graphic forms of Latin letters, raised in modern times to independent value, are two, J, V; 8, recent addition, made by doubling an old sign, is one letter, W. If we had shown, in the handling of the system of signs received from abroad, the same freedom and independence as the Greeks and Romans, we should have an alphabet of at least 32 letters, instead of 26; for we require separate representatives for the vowel sound in *cat* and *care*, for that in *what* and *all*, and for that in *but* and *burn;* and for the sibilants in *shun* and *azure*, the initial spirants of *thin* and *this*, and the nasal in *singing;* while the *ch* sound in *church* is also, though strictly of compound nature, well entitled to a separate character: the C, Q, and X, on the other hand, having no value which should render their retention necessary.—The ground of the arrangement of our alphabet is in the main inferrible from the account of its history given above, being, when once started from the Phœnician basis, strictly a historical one: A to F follow the Phœnician order; G was put by the Romans in the place of the consciously omitted Z; H and I, again, have their Phœnician positions; J follows the letter of which it is, as it were, the recently separated shadow; K to T, again, are in their Phœnician places; U comes next, as being the first addition made by the Greeks, and it is succeeded by V and W, as I by J; X is another Greek addition, adopted into the earliest Roman alphabet; Y and Z are the later additions made to the Latin from the Greek. When, however, we come to inquire into the reason for the Phœnician order itself, we are baffled, and unable to arrive at any satisfactory results; the arrangement seems to be almost altogether fortuitous. Probably it is not by accident that the three sonant mutes, *b*, *g*, *d*, come together, next after the *aleph;* nor that the three liquids, *l*, *m*, *n*, are also found side by side later; but all attempts at explanation beyond this are little better than mere guesses, and involve theories respecting the origin of the alphabet which reach far beyond our actual knowledge. For we really are wholly in the dark as to the antecedents of the old Semitic mode of writing; neither tradition and history, nor the traced relation of its characters to those of other modes of writing, nor their own shapes and names, afford ground for anything more than unrestrained conjecture. The names of the characters are each the name of some sensible and depictable object, which has for its initial the letter named: thus, *aleph*, ox; *beth*, house; *gimel*, camel; *daleth*, door; and so on. Considering that many Egyptian phonetic hieroglyphs are well known to have gained the office of representing certain sounds because those sounds were the initials of the objects depicted (thus, the eagle, *ahom*, becoming a sign for *a;* the lion, *labo*, for *l*), the supposition has seemed a highly plausible one that the Phœnician letters also were originally rude pictures of the objects indicated by their names. And this supposition receives a degree of confirmation from a certain resemblance traceable in a few cases between the letter and the object: thus, the sign for *aleph* is not unlike the front of an ox's head; *mem*, water, is like one of the common conventional signs of water, a waving or indented surface; and *ain*, eye (our O), is a tolerable eye in outline. Yet the evidence of such a kind is too scanty to be much relied on, and it is quite as plausible a theory that names should have been chosen on acrophonic grounds for a set of signs otherwise originated; and that a few among them should happen to be, or should have been, chosen because they were suggestive of an object resembling the sign itself. —The Phœnician alphabet, as completed in system and worked over in shape by the Greeks and Romans, has become the most convenient and useful of all the modes of writing invented by men; and it has gone with European civilization over a great part of the globe. Efforts are making to introduce it among various eastern nations in substitution for their own more cumbrous and incomplete alphabets; but with little success hitherto, since national prepossession clings with especial tenacity to an institution so inwoven by tradition and custom with a nation's feeling as is its national mode of writing. Efforts, again, have been made to expand this alphabet, by diacritical marks and added signs, into a system capable of accurately representing all the various sounds (some scores in number) which are made by human organs in the utterance of language; the most conspicuous of these efforts is that of Prof. Lepsius of Berlin ("Standard Alphabet," &c., 2d edition, London and Berlin, 1863). Others, yet again, have devised alphabets founded on an analysis of the physical processes of production of each sound, and representing those processes by suggestive signs, so as to make each letter by its shape define the precise mode of its own utterance: for example, Dr. Brücke of Vienna ("Proceedings of the Vienna Academy," vol. xli., 1863), and Mr. A. M. Bell of London ("Visible Speech," &c., London, 1867). Into an account of these attempts we cannot here enter. Nor can we speak in detail of the other alphabets invented and in use among other parts of the human race. Respecting some of them, the articles on special languages, and that on WRITING, will give information.—In order to make clearer the relations of the Greek and Latin to the Phœnician or ancient Semitic alphabet, as they have been described above, the following comparative table is given. The first or left-hand column presents the Phœnician letters: their forms (which vary more or less considerably in records of different age and locality) are in part those of the great Sidonian monument of King Eshmunezer (probably 500 B. C.), in part those of the recently discovered Moabite inscription of King Mesha (earlier than 800 B. C.); the prefixed names have their Hebrew version, and their correspondence with the Greek is apparent at a glance. The second column gives the forms of the letters as first employed by the Greeks, when writing from right to left. In the third are seen the Greek letters as finally adopted, being made to face in the other direction and somewhat further modified in form. The fourth column is that of the Latin letters; here some of the earlier forms are added to those with which we are familiar, for the purpose of illustrating the transition more fully.



ALPHEUS, the ancient name of the Ruphia, a river of Peloponnesus, which rises in southern Arcadia, and, flowing through Elis and the Olympian plain, discharges itself into the Ionian sea. The Alpheus, at a little distance from its source, twice disappears under ground, which gave rise to the myth of the god of the river, and the nymph Arethusa, whom Diana essayed to save from his embraces by transforming her into a fountain, and placing her in the Ortygian isle, near Sicily. The god made a passage for his river beneath the intervening sea, and commingled its waters with those of the fountain in Ortygia.

ALPINE, an E. county of California, bounded N. E. by Nevada; area, 1,000 sq. m.; pop. in 1870, 685. The western portion is occupied by the Sierra Nevada range, including Carson's pass and Pyramid peak. It is rich in silver. In 1870 there were 57,165 sheep, producing 281,700 lbs. of wool. The other productions were small. There were 3 quartz mills, 8 saw mills, and 2 newspapers. Capital, Silver Mountain.

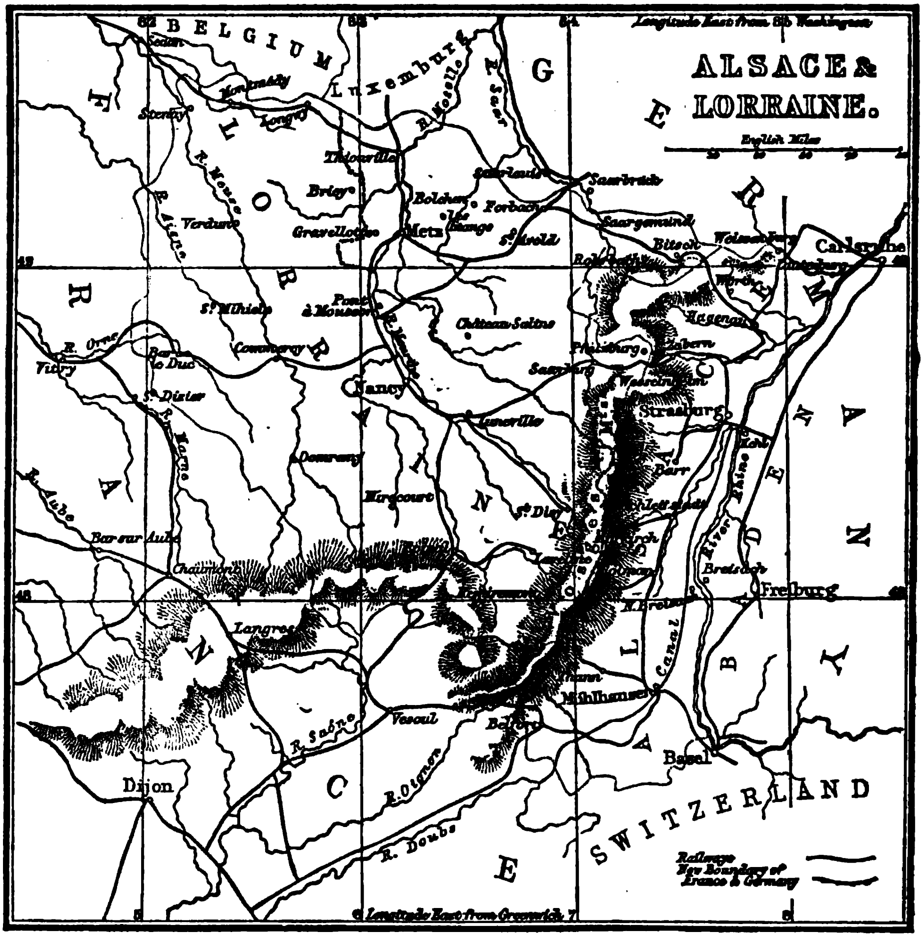
ALPS, the highest and most remarkable chain of mountains in Europe, forming the watershed between the rivers which discharge their waters into the Mediterranean, and those which run to the Atlantic ocean, the North sea, and the Black sea. The Alps have a general crescent-like form, and extend through fourteen degrees of longitude and five of latitude. From the principal chains spurs extend to the Apennines, the Pyrenees, the Vosges, the Hartz, the Sudetes, the Carpathians, and the Balkan. The average height of the different ranges is about 7,700 ft., from which altitude more than 400 peaks rise into the region of perpetual snow. The principal subdivisions of the Alps are the following: I. The Maritime Alps, consisting of two portions, of which the first, distinguished as Ligurian Alps, extends in a semicircle from the S. W. extremity of the Alpine chain to the Col de Lauzania in Piedmont, and forms the line of separation between that province and the French department of Alpes-Maritimes (the former circle of Nice); the second, distinguished as the Upper Maritime Alps, terminates on the W. frontier of Piedmont in the lofty peak of Monte Viso. The principal altitudes of the Maritime Alps are: peak to the W. of the village of Mauricio, 13,107 ft.; Monte Viso, 12,582 ft.; Monte Pelvo, 9,958 ft.; Col de Maurin, 9,784 ft. II. The Cottian Alps, extending, in a triangular form, from Monte Viso to Mont Cenis, having Piedmont on one side, Savoy on another, and the department of Hautes-Alpes in France on the third. They give rise to the Durance, the Po, and several smaller streams. The principal summits are: Mont Olan, 13,831 ft.; Mont Pelvoux, 13,440; Mont Galéon, 12,467; Mont Genèvre, 11,785. III. The Graian Alps, the Gray Alps of the German geographers, extending from Mont Cenis to the Col du Bonhomme, between Savoy on the W. and Piedmont on the E., giving rise to several tributaries of the Po and the Rhône. The most elevated summits in this chain are: Mont Iséran, 13,274 ft.; Aiguille de la Sassière, 12,346; Rocca Melone, 11,569; Mont Cenis, 11,457. IV. The Pennine Alps, extending from the Col du Bonhomme to Monte Rosa, between upper Savoy and the Swiss canton of Valais on one side, and Piedmont on the other. This chain includes the three loftiest mountains in Europe, as well as several other peaks of considerable elevation, namely: Mont Blanc, 15,732 ft.; Monte

Rosa, 15,150; Mont Cervin, 14,835; Le Géant, 13,800; Aiguille du Midi, 12,743; Mont Velan, 11,063; Pic Blanc, E. of Monte Rosa, 11,190. V. The Lepontine or Helvetian Alps, including the divergent chain known as the Bernese Alps. This division covers western Switzerland, extending on both sides of the Rhône, dividing Lombardy from Switzerland, and one branch terminating at Monte Bernardino, while the other extends to and unites with the Jura mountains N. of Lake Geneva. This portion of the Alps is more visited than any other, and comprises the finest mountain scenery in Europe. Its most elevated peaks are: the Finsteraarhorn, 14,106 ft.; the Furca, 14,037; the Jungfrau, 13,718; the Mönch, 13,498; the Schreckhorn, 13,386; the Eiger, 13,075; the Blümlis Alp, 12,140; Monte Leone, on the Simplon, 11,541; the Galenstock, the highest of the St. Gothard group, 12,481; the Moschelhorn, in the Rheinwald, 10,870; the Grimsel, 9,704. VI. The Rhætian Alps, commencing at Monte Bernardino, extending along the frontiers of Switzerland, Italy, and Austria, and terminating at the N. E. extremity of the Tyrol. The principal summits are: Mount Julier, 13,855 ft.; the Ortlerspitze, 12,852; Monte della Disgrazia, 12,060; the Wetterhorn, 12,176; Monte Gavis, 11,754; the Dödi, 11,735; and several other peaks of nearly the same altitude. VII. The Noric Alps, commencing at Dreiherrenspitze, where the preceding division terminates, extend through Salzburg, northern Carinthia, Styria, and Upper and Lower Austria, forming the dividing line of the basins of the Salza and the Drave. Their highest peaks are: the Gross-Glockner, on the confines of Tyrol and Salzburg, 12,776 ft.; the Wisbachhorn, in Carinthia, 11,518; the Hohenwart, in Carinthia, 11,075; together with several other summits nearly 10,000 feet high. VIII. The Carnic Alps, extending, on the confines of Venetia and Carinthia, from Pellegrino to Terglou, separating the waters of the Gail from those that flow into the gulf of Venice, and sending out a spur to divide the waters of the Save and the Drave. Its highest peak is La Marmoluta, 11,508 ft. IX. From Terglou this chain is prolonged through Görz and Carniola to Mount Kleck under the name of the Julian or Pannonian Alps. Its loftiest summit is the Terglou, 10,866 ft. X. A southern continuation, called the Dinaric Alps, extends from Mount Kleck through Croatia, Dalmatia, and Herzegovina, to the neighborhood of the Balkan. The St. Gothard range is the culminating point of all these chains of the Alps, and is distant in a direct line from the Mediterranean about 150 miles, 225 from the Adriatic, 525 from the Atlantic, 500 from the North sea, and 550 from the Baltic. It will be evident from these distances that the southern slope is far more rapid and precipitous than the northern. —The line of permanent snow for the whole Alps averages about 8,000 to 9,000 feet of altitude. On the northern slope it is usually 600 or 700 feet lower than on the southern. The glaciers of the Alps (German, *Gletscher*) form one of the most remarkable features. From the peaks, more than 400 in number, which rise above the line of perpetual snow, there descends into the valleys below a mass of partially melted snow and comminuted ice, often of very great extent. Constantly pressed forward by the accumulation of ice and snow behind it, nothing can resist its onward progress; trees, rocks, houses, all are borne forward on its slow-moving surface, till it reaches the point where the sun's rays are sufficiently fervid to melt the mass, when it forms the source of some mighty river. Often these glaciers present a comparatively smooth surface, the pieces of ice of which they are composed varying in size from a pea to a walnut, but not unseldom they are rent by huge fissures, which are impassable by travellers. The most remarkable of these Alpine reservoirs are the glaciers of Mont Blanc, which cover an area of from 90 to 100 square miles. The Mer de Glace, the largest of these, on the northern declivity of the mountain, is 15 miles long, from 3 to 6 miles wide, and from 80 to 120 feet thick. (See GLACIER.) The whirlwinds of the Alps are worthy of notice, not only from their terrific violence, often overwhelming the hapless traveller with the blinding snow, but from their frequently setting in motion the dreaded avalanche. So precipitous are many of the slopes of the Alpine peaks, that the giving way of a slight barrier, a tree or bowlder, perhaps, is sufficient to detach from its original position a vast mass of snow and ice; this, gathering force from its fall, brings sudden and inevitable destruction on whatever may be on its track, burying at times whole villages, crushing extensive forests, and filling up the beds of rivers. In some parts of the Alps, these masses are so delicately poised that the jar of a footstep, the ringing of a small bell, the breaking of a stick even, is sufficient to cause their precipitation. The optical illusions of the Alps, resulting from a condition of the atmosphere analogous to that of the mirage, have been the subject of much comment. The spectre of the Brocken is the most remarkable of these. It is observed on one of the summits of the Noric Alps. Mont Blanc, the highest mountain in Europe, was first ascended in 1786 by Jacques Balmat, and soon afterward by Dr. Paccard and De Saussure. Its ascent is now a common though dangerous feat of adventurous travellers.—The geological structure of the Alps has long puzzled geologists and given rise to most various and ably supported views. By some, the whole mass composing Mont Blanc and surrounding mountains was considered metamorphic and of comparatively recent date; others regarded the nucleus as primitive and of great antiquity, while the stratified rocks on the lower Alps were referred to different ages from carboniferous to miocene. The presence of carboniferous plants in formations containing nummulitic limestone was interpreted by some to indicate that the carboniferous flora survived longer in this region than elsewhere; while others explained the apparent anomaly by an inversion of strata. True granite is rare in the vicinity of Mont Blanc, but occurs in several localities, of which Valorsine is best known. Both here and at the Col de Balme and the Aiguilles Rouges a porphyroid granite sends veins into the adjacent gneiss, and appears to be true eruptive granite. Many of the apparently eruptive granites, however, are claimed by M. Alphonse Faure, who has recently (1867) published a valuable work on Alpine geology, as the results of aqueous infiltration. The protogine of the Alps seems to differ from ordinary granite in composition, according to Delesse, in the presence of one or two hundredths of oxide of iron and magnesia. The crystalline protogine forms the centre of Mont Blanc and other peaks, and appears in a curious fan-like form extruded through the secondary strata by breaks which Élie de Beaumont compares to gigantic buttonholes. The flanks are formed by crystalline schists. Both the protogine and the schists have been considered by all who have studied them stratified rocks, gneissic in structure, passing in places into more schistose varieties, and by no means well separated from each other or the chloritic, talcose, or mica schists of the flanks. The uncrystalline strata in the neighborhood of Mont Blanc includes representatives of the carboniferous, triassic, jurassic, neocomian, cretaceous, and tertiary. The anthracite system, as held by Scipion Gras, was estimated to have a thickness of 25,000 to 30,000 feet, and included, besides dolomites and gypsum, now referred by Faure to the triassic, layers of anthracite, coal plants, limestones containing belemnites of jurassic age, gneissic, micaceous, and talcose rocks supposed to be due to the local alteration of members of the anthracite system. To this miscellaneous collection Pillet added in 1860 nummulitic beds. The many recognized disturbances of the strata were made to explain all anomalies of grouping to the satisfaction of some, but Sismonda and Élie de Beaumont, in a memoir presented to the academy of sciences at Paris describing the sections exposed by the Mont Cenis tunnel, hold that there is no evidence of inversion, dislocation, or repetition in the series of 7,000 metres of strata. Faure indicates the geological history of Mont Blanc, and of the principal portions of the Alps, as follows: In a shallow ocean covering gneiss and crystalline schists, the carboniferous beds were deposited; some disturbance occurred, as secondary deposits are laid down unconformably over all the older formations, gneissic as well as carboniferous; then came the nummulitic limestones and their overlying sandstones, thus embracing a bed from the trias up of a thickness of about 3,800 feet; then came the great upheaval folding these strata, enclosing nummulites and coal plants in crystalline schists; then the work of denudation removed the secondary strata, leaving a few evidences of their former existence, as in the beds more than 100 feet thick of jurassic and infra-jurassic age which cap the Aiguilles Rouges. The glacier action on the slopes of the Alps has been studied by De Saussure, Agassiz, Forbes, Tyndall, and others, and, from its extent and the comparative accessibility of the Alpine glaciers, has furnished ground for almost all the present knowledge of the geological work of snow and ice on mountain slopes. The formation of the Alps can no longer be considered an event of recent geological periods, at least so far as the crystalline rocks are concerned, although perhaps the extension and exposure of these ancient crystalline rocks may be recent geologically considered. The phenomenon of transportation of vast blocks of rock across Alpine valleys will be treated of in the article Drift. Many metals are abundantly distributed through the Alpine strata, which will be more particularly described under the head of the different countries in which they occur.—The great height of many of the Alpine summits gives an extraordinary variety to their vegetation. At the base of the mountains it is very rich and beautiful, commingling the productions of a temperate clime with those of a more elevated region, the result of the seeds brought down by the mountain torrents. At the height of 1,600 or 1,700 feet we find a change; the flora is less beautiful, though still rich and abundant; the *primula auricula* or bear's ear, the *gentiana acaulis*, the *aconitum napellus* or wolf's bane, the *trollius Europæus*, and the *ranunculus aconitifolius*, are the most characteristic plants. At 3,300 feet the *soldanella alpina*, the *crocus vernus*, and two species of rhododendrons, adorn the declivities. At the height of 6,500 feet all the vegetation of the plains, including maize and the cereal grains, has disappeared; the common fruit and forest trees have ceased, and dwarfish larch, alder, and birch trees have taken their places, soon to be succeeded by the stunted pine, *pinus mugho*, and *cembra*, above which, from the line of 7,450 to about 8,500 feet, extends pasturage of a very rich and nourishing character, and a flora which from its peculiar character is distinguished by botanists as alpine. Its principal genera are *androsace*, *silene*, *saxifraga*, *ranunculus*, *gentiana*, and *pyrethrum*. Of most of these, several species are found. Even amid the eternal snows, Agassiz distinguished several varieties of lichen.—Animal life is abundant throughout the Alpine chains. Herds of cattle find pasturage on their slopes; the wolf, fox, lynx, and wildcat abound in their forests; the bear hibernates in their caves; the marmot and the mole burrow in their pasture grounds. Several animals are peculiar to the regions; among these are the chamois, which inhabits the upper limit of the forest region, the mountain goat, and a species of white hare. Among the birds of prey, the lämmergeier, a gigantic vulture, is peculiar to the Alps, and, with the eagle, commits serious ravages on the sheepfolds of the loftier pasturage grounds. Nearly one half of all the known birds, resident or of passage, in central Europe, inhabit the Alps. The number of reptiles is not large, but four or five species of them are not found elsewhere. In the valleys of the Hautes-Alpes, the Basses-Alpes, Isère, Aosta, and the Grisons, as well as some other of the narrow and ill-ventilated ravines of the Alps, a large proportion of the inhabitants are affected with goitre and cretinism.—The Alps were formerly deemed almost impassable. Large bodies of men, hemmed in by the deep snows, perished miserably in attempting to cross them, and Hannibal's bold passage over them was considered for ages a more daring feat of military prowess than his subsequent victories. Now, however, nearly every portion is crossed by good roads. The principal roads crossing the Alps are over the following passes, of which the chief connect Switzerland with Italy: 1. The Mont Cenis, 6,773 feet high, built under Napoleon I. in 1803–'10, was crossed by diligences in eight hours, from St. Michel to Susa, connecting with the Chambéry and Turin railway. The temporary Fell railway, opened in 1868, has been superseded by the celebrated tunnel, which lies about 16 m. from the Mont Cenis pass. It was begun in 1857, and inaugurated at Bardonnecchia, Sept. 17, 1871. On the Mont Cenis pass there is a hospice with 40 rooms. 2. The Little St. Bernard (hospice 7,076 feet high), one of the oldest and easiest passages, supposed to have been crossed by Hannibal, was designed by Napoleon I. as a military road connecting Grenoble with Aosta and thence with Turin. There is a carriage road from Courmayeur to La Thuile, and a new road was opened in 1868 from the hospice to Bourg St. Maurice. The latter place is reached from Courmayeur in about 9½ hours. The boundary line of France and Italy passes along the crest of the road. 3. The Col de Balme pass, 7,218 feet, from Martigny to Chamouni, is celebrated for its view of Mont Blanc, though inferior in variety to the Tête Noire pass (28 m.), which leads over the same ground and is much frequented. 4. The Great St. Bernard, about 8,000 feet, from Martigny to Aosta, 47 m., connecting with Turin, and celebrated for its hospice and dogs. This pass was crossed by Napoleon I. with 30,000 men in 1800. 5. The Simplon, 6,628 feet high, a colossal work of Napoleon I., built in 1800–'6, extending from Brieg to Domo d'Ossola, 46½ m., connecting Geneva with Milan. The carriage road formerly began at Sierre, but the distance between that place and Brieg, 23½ m., is now passed by railway. 6. The new carriage road over the Furca pass, 8,150 feet, completed in 1867, and connecting the St. Gothard directly with the valley of the Rhône, has considerably increased the traffic across the Upper Valais, the Bernese Alps, and the Simplon. It runs closer to the glaciers than any other road excepting the Stelvio. The Schreckhorn, the Finsteraarhorn, and the range from Monte Leone to the Weisshorn, are seen from this road. 7. The St. Gothard. A railroad over the St. Gothard pass (6,936 feet) is in course of construction, Italy contributing 45,000,000 francs, Switzerland 20,000,000, the North German Confederation 10,000,000, the grand duchy of Baden 3,000,000, and the other German states the additional cost. Until the completion of this railway, the road over the St. Gothard (built in 1820–'30) continues to be crossed by the diligence from Flüelen to Bellinzona in about 15 hours, connecting Lucerne with Milan. The passage was known to the Romans. Avalanches caused great loss of life in 1478, 1624, and 1814, the road being unprotected against precipices. Suvaroff's successes over the French in 1799 are recorded in an inscription on the top of the mountain. 8. Bernardino, 6,770 feet, built in 1822, extending from Coire to Bellinzona, distance by diligence 16 hours, and thence connecting with Milan. A bridge over the Rhine, below the village of Hinterrhein, the Marscholhorn, and the Schwarzhorn, are the principal sights. The road was known to the Romans. 9. The Splügen, 6,495 feet, built in 1818–'22, crossed in about fourteen hours from Coire to Chiavenna, connecting with Milan. Macdonald's troops, while crossing the Splügen, Nov. 27 to Dec. 4, 1800, were almost buried by avalanches, nearly 100 men and as many horses being lost. 10. The Bernina, 7,672 feet, connecting the Engadine by way of Samaden and Tirano, 39 m., with the Valtellina. A footpath of 10 hours, up the Val de Fani to the Col of La Strella, leads to the baths of Bormio (Worms). The old path over the Bernina is so dangerous that horsemen prefer the huge circuit by Pisciadella. 11. The Julier pass, 7,558 feet, from Coire to the Engadine. The road begins at Churwalden and ends at Samaden. That by the Valbella pass meets the Julier road at Tiefenkasten, whence there are three passages, through the Julier, Valbella, and Albula passes, to the celebrated valley of the Inn. 12. The Stelvio pass, 9,100 feet, connecting Milan with Innspruck. It is the highest Alpine road practicable for carriages. It was built in 1820–'25 from Stelvio (Stilfs), a village of Tyrol, to Bormio, in the Valtellina, and extended in 1825–'34 to Lecco on the lake of Como. This pass is remarkable for glaciers, especially of the Ortles range, for the gorge of Spondalunga, and above all for the scenery of the lake of Como. The damage done to the road in the Austro-Italian war of 1859 has been repaired. 13. The principal road connecting Tyrol with Lombardy is the railway over the Brenner, from Innspruck to Botzen, opened in August, 1867. The old road, known to the Romans as Mons Brennius, has been accessible to carriages since 1772, and is crossed in four hours. This pass was one of the scenes of the Tyrolese rebellion of 1809. 14. The

Semmering railway, from Gloggnitz to Mürzzuschlag, completing the connection between Trieste and Vienna, opened in July, 1854, and remarkable for its numerous tunnels and colossal viaducts, passes over the Semmering pass, which is situated on the boundary of Lower Austria and Styria. A hospice was built by a Styrian duke in the wilderness of the mountain in the 14th century. A carriage road completed in 1728 was superseded in 1840 by a new road. Besides these there are many passes of minor importance, though some of them remarkable for beautiful views and scenery. —The "Alpine Club," established in London in 1858, gave new impulse to explorations among these summits. The president of the club, Mr. J. Ball, has published "The Alpine Guide" (3 vols., 1863–'7); and the "Alpine Journal," recording Alpine phenomena and ascents, has been published since 1863. Alpine clubs have since been established in Vienna (1862), Turin (1863), Bern (1863), Aosta (1868), and Munich (1869). The proceedings and explorations of these associations are recorded in various periodical publications, as the *Giornale delle Alpi, degli Apennini, e dei Vulcani*, published at Turin since 1864; the *Jahrbuch des österreichischen Alpenvereins*, at Vienna since 1865; *Jahrbuch des schweizer Alpenclubs*, at Bern since 1864; *Zeitschrift des deutschen Alpenvereins*, at Munich since 1869; *Alpenfreund*, at Gera since 1870; *L'Écho des Alpes*, at Geneva since 1870. The explorations in Switzerland are conducted systematically according to Dufour's topographical map, the Alpine club of Bern being divided into committees for expeditions to the different mountainous regions. The committee relating to the Glarus (Tödi) district caused a panorama of the Ruchen Glarnisch to be published by A. Hein (Glarus, 1870), with the statistics of about 350 mountains, peaks, passes, and lakes.—Among the principal recent works on the Alps are the brothers Schlagintweit's *Untersuchungen über die physikalische Geographie der Alpen* (Leipsic, 1850), and *Neue Untersuchungen über die physikalische Geographie und Geologie der Alpen* (1854); Prof. Tyndall's "Peaks, Passes, and Glaciers" (London, 1860–'62), and "Mountaineering in 1861" (1862); Schaubach's "German Alps" (5th ed., 1864–'7); Tschudi's *Thierleben der Alpenwelt* (8th ed., Jena, 1868); Edward Whymper's "Scrambles on the Alps, 1860–'69, including the First Ascent of the Matterhorn and the Attempts which preceded it" (London, 1871); Berlepsch's *Alpen* (4th ed., 1871); and "The Switzers," by William Hepworth Dixon (London, 1872). Geological descriptions of the Alps are contained in Prof. Sedgwick's and Sir Roderick Murchison's contributions to the London geological society.

ALPUJARRAS, or **Alpuxarras** (Ar. *Al-Bushara*t, Pasture Mountains), a mountainous region in the old province of Granada, Spain, lying between the Sierra Nevada and the Mediterranean, and including part of the modern provinces of Granada and Almeria. After the taking of Granada by Ferdinand, the Moors remaining in the country were driven to this district, whence, after long struggles and desperate resistance, they were finally expelled by Philip III., in 1610. The Sierra de Gador, the highest summit, rises 6,550 feet above the sea level.

ALSACE (Ger. *Elsass*), formerly a province of France, bounded by Lorraine, the Palatinate, Baden, Switzerland, and Franche-Comté, and constituting the departments of Haut-Rhin and Bas-Rhin; since the treaty of May 10, 1871, the main part of the German Reichsland (imperial territory) of Alsace-Lorraine. It is now divided into the departments of Lower Alsace and Upper Alsace, and embraces an area of 3,175 sq. m., and a population of 1,083,886, exclusive of Belfort, formerly in Haut-Rhin, and some other portions of territory, which have been restored to France, and inclusive of some minor portions annexed from Lorraine. The Vosges mountains extend along its western side, and the northeastern offshoots of the Jura cross its southern limits; but the central and eastern part consists of a fertile plain lying along the western side of the Rhine, which here forms the boundary between it and Baden. The Ill and its tributaries are the other principal streams. There are several canals, of which the Rhône canal is the largest. The manufactures are important, comprising cloth of various kinds, cotton yarn, paper, beet-root sugar, beer, brandy, and oil. The principal cities are Strasburg, Mühlhausen, and Colmar. —As attested by monuments still extant, Alsace had a dense population of Celts several years before the Christian era. It was occupied by the Rauraci, the Tribocci, and the Nemetes at the time of the Roman invasion; was the theatre of the defeat of Ariovistus by Julius Cæsar, 58 B. C., and formed part of Celtic Gaul, as the Roman province of Germania Superior, called afterward Germania Prima. The Alemanni first invaded Alsace in the 3d century, and after the close of their long struggle with the Romans, the population, decimated by war, was rapidly filled up in the 5th century by Germanic settlers, who were called Ill-Sassen, *i. e.*, dwellers on the Ill, the main Alsatian affluent of the Rhine. After the defeat of the Alemanni near Zülpich in 496, Alsace became known under Frankish rulers as the duchy of Alsatia. In the 7th century, under the Frankish duke Adalric (Etticho) and his daughter Odilia, who became the patron saint of Alsace, great progress was made in Christianizing the country. In the 9th century it was part of Lothaire's empire. In 924 it was annexed to Germany by Henry the Fowler, but it was continually claimed as a Frankish possession until the extinction of the Carlovingian dynasty in 987. It then remained for several centuries in the undisputed possession of Germany as an Alemannian or Swabian duchy, under various rulers and subjected to many vicissitudes. The revolt of the Alsatian peasantry, the most violent outbreak during the religious conflicts of the 16th century, was quelled May 17, 1525, by the bloody victory achieved by Duke Anthony III. over the peasants. Part of Alsace was allotted to France by the treaty of Westphalia (1648). Strasburg was seized by Louis XIV. in 1681, and the whole country came under French authority by the treaty of Ryswick in 1697, with the exception of Montbéliard and Mühlhausen, which were acquired by France subsequently. In 1814 Saarlouis and Saarbrück were ceded to Prussia, and Landau and the adjoining localities to Bavaria. The French made strenuous efforts to Gallicize their Alsatian possessions, but German continued to be the language of the masses, except in the large cities, where the speech and modes of life of the upper classes were generally French. According to Böckh, in his work on the German-speaking nationalities in Europe (Berlin, 1870), there are hardly 100,000 out of the whole population who do not speak German. In the Franco-German war the recovery of the old German possessions of Alsace and Lorraine became a strong national aspiration. On July 22, 1870, the Rhine bridge at Kehl, opposite Strasburg, was blown up by the Germans. Weissenburg was stormed by them Aug. 4, and the battle of Wörth was fought Aug. 6. Strasburg surrendered Sept. 27, 1870; Schlettstadt, Oct. 24; Neu Breisach, Nov. 10; and Belfort, Feb. 16, 1871. Alsace was formally ceded to the German empire by the treaty of peace of Frankfort, concluded May 10, 1871. W. Menzel, A. Schmidt, and Wagner wrote in 1870 on Alsace and Lorraine. Among recent French historians of Alsace are Boyer (Paris, 1862) and Baquol (3d ed., Paris, 1866).



ALSACE-LORRAINE (Ger. *Elsass-Lothringen*), a division of the German empire, officially designated as the German Reichsland (imperial territory), and composed of Alsace and those portions of Lorraine conquered from France in the war of 1870, and formally ceded to Germany by the treaty of Frankfort, May 10, 1871. It passed by the terms of its cession into the possession of the whole empire, and not of any one division of Germany, and it is under the immediate control of the imperial government. The territory originally occupied by the Germans in 1870, and formed in August of that year into a district under the temporary government of a governor general, included the French province of Alsace with its two departments Haut-Rhin and Bas-Rhin, two arrondissements (Kaufmanns-Saarbrück and Salzburg) of the department of Meurthe, and three arrondissements (Saargemünd, Metz, and Diedenhofen, Fr. *Thionville*) of the department of the Moselle. The canton of Schirmeck and a part of the canton of Saales, both from the department of Vosges, were added in December. The treaty of peace made important changes in the extent of these districts. The Germans restored to France the following portions of the conquered territory: 1. From the department of Haut-Rhin. Arrondissement of Belfort: the cantons Belfort, Delle, Giromagny, and 21 out of the 29 communes composing the canton of Fontaine. Arrondissement of Altkirch: three communes of the canton of Altkirch. Arrondissement of Colmar: four communes of the canton Masmünster. 2. From the department of Meurthe. Arrondissement of Saarburg: eight communes of the canton of Saarburg, and nine of the canton of Vic. Arrondissement of Salzburg: three communes of the canton of Salzburg. 3. From the department of Moselle. Arrondissement of Metz: 11 communes of the canton of Gorze. By an additional article, ratified in Berlin, Oct. 20, the comparatively unimportant communes of Raon-les-Leaux, Raon-sur-Plaine, and Igney, with a part of Avricourt, were also restored to France. By the treaty, however, there were ceded to Germany 12 communes of the cantons of Audun and Longwy, arrondissement of Briey, department of Moselle. The entire Reichsland, as permanently organized by Germany after these complicated changes, is bounded by Luxemburg, Rhenish Prussia, Rhenish Bavaria, Baden (from which it is separated by the Rhine), Switzerland, and the French departments of Haute-Saône, Vosges, and what remains of those of Meurthe and Moselle; area, 5,594 sq. m.; pop. in 1871, 1,549,459. The natural features of the country, and its history to 1870, are described in the articles ALSACE and LORRAINE.—The government, as organized by the Germans, centres in the provincial diet (*Landtag*). The Reichsland is divided into 23 circles (*Kreise*), each having a Kreisdirector at the head of its local government—an officer nearly corresponding to the sub-prefect of a French arrondissement. The old French division into communes (Ger. *Gemeinden*) and cantons (Ger. *Cantone*) is retained with some unimportant changes. Before its cession to Germany, the territory belonged to five French departments, namely, Haut-Rhin, Bas-Rhin, Vosges, Meurthe, and Moselle; it is now divided into three *Bezirke* (districts), called Ober-Elsass (generally corresponding to the former Haut-Rhin), Nieder-Elsass (Bas-Rhin), and Deutsch-Lothringen (German Lorraine).—The educational establishments have been reëstablished on the plan of similar German institutions, and education has been made by law independent of all sectarian influence. The language of the common people is generally German in Alsace; in Lorraine more French is spoken. Both languages are commonly understood, and near the former frontier both are used.

ALSEN, a Baltic island in the Little Belt, in lat. 55° N., lon. 10° E. It was taken from the Danes by the Prussians, June 29, 1864, and now constitutes, together with a portion of the opposite mainland (joined by a drawbridge), the circle of Sonderburg, in the Prussian province of Schleswig-Holstein; area, about 125 sq. m.; pop. in 1868, 34,551. The island is fertile, and contains fine woods and fresh-water lakes, which abound with fish.

ALSTED, Johann Heinrich, a German Protestant divine and author, born in 1588, died in 1638. He was for some time professor of philosophy and divinity at Herborn in Nassau, and afterward at Carlsburg in Transylvania. Among his writings are an *Encyclopædia*, in two large folios (Herborn, 1630), the most complete work of the kind that had then appeared; *Thesaurus Chronologiæ;* and *Triumphus Bibliorum Sacrorum*, intended to prove that the principles of all arts and sciences are contained in the Scriptures. His *Tractatus de Mille Annis* (1627) maintains that the millennium was to commence in 1694.

ALSTON, John, a merchant of Glasgow, and director of the asylum for the blind in that city, died in 1846. In 1832 the society for the encouragement of the useful arts in Scotland offered a gold medal for the best form of letter adapted to relief printing for the blind. Mr. Alston and Mr. Taylor of Norwich were constituted referees. An alphabet in Roman capitals was, after some modification by Mr. Alston, adopted by the society. From this time Mr. Alston devoted himself to the work of supplying the blind with books. The cost of preparing these is very great, yet Mr. Alston, aided by contributions, succeeded in publishing the Scriptures in 19 volumes, and 23 volumes of miscellaneous works, besides maps and cards.

ALSTRÖMER. I. Jonas, a public-spirited Swede, born of poor parents at Alingsås in West Gothland, Jan. 7, 1685, died June 2,1761. He made a fortune in England by commercial speculations, and introduced into Sweden improved breeds of sheep, the culture of potatoes and of dye plants, established woollen and other manufactories at Alingsås, and contributed to the formation of the Levant and East India companies. He was ennobled and had a statue erected to him on the Stockholm exchange. **II. Klas,** a botanist, son of the preceding, born at Alingsås, Aug. 9, 1736, died March 5, 1796. A devoted pupil of Linnæus, he collected for him in his rambles over Europe, particularly Spain, various specimens of flowers, the most remarkable of which was that of a Peruvian plant, afterward extensively cultivated under the name of Alströmer lilies or incas.

ALTAI, a mountain range on the boundary between Russia and China, divided into various groups. The mountains were long designated as the Great and the Little Altai, and the name Altai is still occasionally applied to the vast network of ranges, chiefly in Chinese and partly in Russian territory, and extending, with irregular branches, from Siberia and China to the N. Pacific, diverging in many directions, intersected by numerous lakes and rivers, and including the Aldan and other mountains. The Altai range in a narrower sense extends from the vicinity of Tomsk, lat. 56° N., to the junction of the Bukhtarma and the Irtish near Bukhtarminsk, lat. 50° N., and from the Kolyvan mountain on the west, lon. 82° E., to the Sayan chain on the east. The region embraced within these limits includes an area of about 40,000 sq. m., comprised in the Russian governments of Tomsk and Yeniseisk, principally in the former. The Altai system proper, sometimes called the Ore Altai on account of its mineral wealth, consists of several ridges extending from the banks of the Irtish in a direction generally E. N. E. At their western extremity they rise above the valley of the Irtish in hills about 500 or 600 ft. high, and within a distance of 15 or 20 m. attain a height of 3,000 or 5,000 ft.; this may be considered the average elevation of the greater part of the ranges, until they approach Lake Teletzkoi. Here they rise above the limit of perpetual snow, many of the peaks reaching an elevation of 10,000 ft., and are known as the Altai Bieli. Beyond Lake Teletzkoi there are two well defined ranges, the principal of which, called the Tangnu Oola, is within the Chinese boundary, and is imperfectly known. The other is pierced by the river Yenisei, which divides it into the Sayanian range and the Ergik Targak Taiga. Eastward of this point the mountains stretch away into the independent chains running E. and N. E. as far as the sea of Okhotsk, and formerly included in the general appellation of the Altai system. Geologically the mountains have been described as a rocky promontory jutting out from the mainland of primitive rocks which forms the table land of Chinese Tartary on the S. into the ocean of diluvial deposits which forms the great Siberian plain. The geological formations, however, have not been carefully studied. Stratified rocks not yet classified form the greater portion of the Altai range. Clay slate, chlorite slate, and mica slate abound in the upper districts; and through these granite, gneiss, syenite, porphyry, and greenstone have forced their way. Limestone, carboniferous limestone, and sandstones especially rich in fossil remains, are also found. The metals are gold, silver, copper, and lead, mines of which at some unknown remote period were worked to a great extent by some unknown people. They were reopened by the Russians in the last century at the W. end of the range; but of late attention has been given almost wholly to the washing of detritus brought down by the Irtish, Obi, Yenisei, and other rivers, whose sands are rich in gold. The product of the other ores is not important. The diminished production of silver being ascribed to the exhaustion of the mines, investigations were instituted by Professor B. von Cotta at the instance of the czar (1858), and resulted in the publication of his geological and mineralogical work on the Altai (Leipsic, 1871). The scenery is grand, especially among the stupendous rocks and glaciers in the heart of the mountains, on the banks of the Katunya. The two pillars of the Katunya are the highest peaks of the Altai, rising to nearly 13,000 ft. The short summer is excessively hot. The extreme cold of the winter is made salutary by the clearness of the atmosphere. In the forests are birch, alder, aspen, acacia, willow, larch, fir, and Siberian stone pine trees. The dried leaves of the *saxifraga crassifolia*, used as a substitute for tea, are gathered in the Tchernaya mountain. The animals of the Altai region are bears, wolves, foxes, lynxes, mountain hares, wild sheep and boars, wild goats, musimons, and occasionally tigers. Venomous serpents are found in the valleys. The best furs are obtained from black-skinned sables, as well as from martens and from the kulonok (*mustela Sibirica*). A marmot peculiar to the Altai haunts the snow. There are otters, beavers, musk deer, numerous elks, large stags, and red deer. The most remarkable bird is the mountain swallow (*hirundo alpestris* or *Daurica*). Among the fishes are red and other salmon, eel pouts, pike, sterlet, and sturgeons; great numbers of the last are used for the manufacture of isinglass and caviare. There are excellent horses, fat-tailed sheep, and a few camels. Game, poultry, and bees abound. Mosquitoes are numerous in summer, especially in the lowlands. Most of the cereals are successfully cultivated, and even melons in the W. part.—The inhabitants of the Altai consist chiefly of white Kalmucks or Teleuts in the east, near Lake Teletzkoi, and the nomadic mountaineer Kalmucks in the southeast. They are governed by native chiefs, the Russian government interfering little with them excepting for the collection of the tribute of furs, to which even some of the tribes living beyond Russian jurisdiction are made amenable. Excepting the peasantry on the north and northwest, chiefly descendants of fugitive Russian serfs, who belong to the orthodox church, and a few tribes of Mohammedan descent, the great bulk of the Altai population are pagans worshipping in temples. Carsten's "Ethnological Lectures on the Altai" (St. Petersburg, 1851) divides the Altai nationalities and languages into Tungusian, Mongolian, Tartar, Finnish, and Samoyed groups, subdivided into various branches, with different vernaculars. Peddlers from the provinces of Moscow and Vladimir periodically visit the Altai, and the great route of travel between St. Petersburg and Peking crosses the range near Lake Baikal, Kiakhta being the Russian frontier town and Maimatchin the Chinese. The Chinese Altai territory, which is little known, is chiefly situated east of the upper Bukhtarme and Lake Dzaizang. The settled Russian Altai region is mainly comprised in the district of Kolyvan Voskresenski, the Russian designation of the mining region of the province of Tomsk, western Siberia, and which includes, besides the S. part of a district of the same name, the districts of Kolyvan, Barnaul, Kuznetzk, and Biisk; area, over 13,000 sq. m.; pop. 350,000.

ALTAMAHA, a river of Georgia, about 140 m. long, which is formed by the confluence of the Oconee and the Ocmulgee, in the S. E. central part of the state. Its course is S. E. through sandy plains and pine barrens to the Atlantic, about 12 m. below Darien, and about 60 m. S. W. of Savannah. For vessels of 30 tons it is navigable through its entire extent.

ALTAMURA, a town of S. Italy, capital of a district of the same name, in the province of Terra di Bari, 28 m. S. W. of Bari; pop. about 18,000. It is walled and beautifully situated in a fertile pastoral country. Neighboring remains are supposed to mark the site of Lupatia, a town of Apulia on the Appian way. The modern town was settled in the 13th century by colonists from Greece, and many of the present inhabitants are of Albanian origin and still wear the Albanian costume. The emperor Frederick II. endowed the town with a magnificent cathedral, and it also contains a college, a hospital, an episcopal palace, and other fine buildings. There are two annual fairs, and the principal products of the vicinity are wine and olives.

ALTAR (Lat. *altus*, high), a place or structure, usually elevated, on which to perform certain religious services. The use of altars in religious worship reaches back beyond the historical era. The earliest account we have of an altar (Gen. viii. 20) shows that it was used for the offering of sacrifices. Later in Biblical history, we find altars sometimes built apparently as memorials of some religious event, and sometimes with a further idea of a distinct act of worship, as where Jacob built an altar and poured a drink offering thereon. Generally, however, the idea of sacrifice attended the altar. In the Jewish system there were two altars, viz., of incense and of burnt offering, besides the table for the shew-bread. Among the surrounding heathen nations, the same custom of erecting altars for purposes of worship may be traced to the earliest antiquity. The altars of Baal, that god of the oldest pagan cultus, are frequently mentioned in Scripture. Among the Greeks and Romans altars were erected to the various gods, and the services varied according to the character and functions of the divinities to which they were dedicated. The materials used in the construction of the ancient altars at first were probably rude stones. In Egypt they were highly wrought with sculptured representations of the gods. The Israelites at their exodus were therefore commanded to make their altars of earth, so that they could not violate the second commandment. Afterward they were made of shittim (acacia) wood and cedar, overlaid with precious metals. The Greeks and Romans made them of earth and rude stones at first, then of highly sculptured stone. There are to this day many cairns of stones in the northern part of Britain, which were probably ancient altars. Similar structures are found on the high tops of the Anti-Libanus range, and some of the structures found in Mexico and the valley of the Mississippi, and in South America, may have been erected for the same purpose. The form of altars has varied among various nations and at different times, as also their elevation. The Jews were forbidden to go up to their altars by steps. In the Latin and oriental churches, the altar is an elevated structure, on which the priest offers the sacrifice of the mass. In the Roman Catholic church, a permanent altar is a solid structure, the top of which must be a slab of stone. Within the altar is a hollow receptacle for the relics of martyrs or other saints, called the sepulchre. The altar is consecrated by a bishop with chrism. A portable altar is a small slab of stone, usually marble, consecrated and containing relics, which is placed on temporary or ordinary wooden and unconsecrated altars, in such a position that the oblation can be placed on it. Where there is sufficient wealth to permit it, the most costly marbles are used in the construction of altars, and the most sumptuous decorations are employed in their adornment. Altars on which the sacrament is reserved have a tabernacle, made in the shape of a small temple. In the East the altars have, instead of a tabernacle, an urn or casket suspended from the ceiling, in which the consecrated hosts are kept. In some Lutheran churches the altar has been retained. Some of the ancient altars remain also in the English churches, though they have been covered in some way, or at least disused. Generally speaking, altars have been abolished in the Protestant churches, and the existence of any such thing as an altar in pure Christian worship is denied. In the church of England and the Protestant Episcopal church of the United States there are, and always have been, many who advocate the use of an altar in place of a common table, and solid altars are to be seen in some churches; occasionally even very beautiful altars of marble, with emblematic devices, rich altar cloths, altar pieces, and conspicuous crosses. The liturgy, however, substitutes the word "table" in place of "altar," which occurs only in one or two occasional offices. In the early church the tombs of the martyrs, especially in the catacombs, were frequently used as altars, whence the present form is evidently derived. The earliest Christian writers use the words *mensa sacra*, *mensa Domini*, θυσιαστήριον, and *altare*, indiscriminately as convertible terms. In the small early churches the altar stood on the floor of the sanctuary; in the churches of the 4th century, which were larger, it was elevated on a platform; and it was subsequently elevated still more, so as to be reached by an ascent of several steps. Until the 13th century it stood in the middle of the sanctuary, and the priest stood behind it, facing the people, as is still the case in the Lateran basilica. Afterward the altar was placed against the wall, or a screen, which occasioned the change in the posture of the priest. This seems to have been peculiar to Rome, however, as elsewhere there is no record of a change in this respect.

ALTDORF, or **Altorf,** a town of Bavaria, in the circle of Middle Franconia, 13 m. S. E. of Nuremberg, on the Schwarzach; pop. about 3,000. It contains an old palace, and manufactories of wooden toys and breweries. The principal trade is in hops. It was an imperial city before the 13th century, and again rose to importance in the 17th, through its university, which in 1809 was merged in that of Erlangen. The university buildings have since been occupied by a normal school for Protestant teachers.

ALTDORFER, Albrecht, a German painter and engraver, born at Altdorf, Bavaria, in 1488, died at Ratisbon in 1538. He is supposed to have been a pupil of Albert Dürer, and is distinguished in Germany for the romantic character of his conceptions. His principal painting, "The Victory of Alexander over Darius," is in the gallery of Schleissheim, near Munich, and his "Birth of our Saviour" in the imperial gallery of Vienna. His engravings are on both copper and wood.

ALTENA, a town of Westphalia, Prussia, on the Ruhr and Sieg railroad, in the district and 17 m. W. S. W. of Arnsberg; pop. in 1871, 7,122. It is situated in a beautiful valley surrounded on all sides by high mountains. The town has for centuries been the seat of a flourishing industry, comprising numerous manufactories of iron and steel wares. Near by, on a high cliff, is the castle of the old counts of Altena (later counts of the Mark), which now belongs to the order of St. John.

ALTENBURG. I. Or **Saxe-Altenburg,** a sovereign duchy of the German empire, bounded by Prussia, Saxony, Weimar, Meiningen, Rudolstadt, and Reuss-Gera, the last of which divides it into two parts, the E. division constituting Altenburg proper and the W. Saal-Eisenberg; area, 510 sq. m.; pop. in 1871, 142,122. It is traversed by spurs of the Erzgebirge, and in the west by ridges of the Thuringian Forest. The principal rivers are the Pleisse and the Saale. The duchy contains several large lakes and mineral springs, extensive forests in the west, and coal mines in the east. It is among the richest in Germany in agricultural products, especially in rye and wheat; a great many cattle are raised, and the horse and sheep are of superior breed. Wild boars and deer abound. The manufactures are leather, woollen cloths, hosiery, linen goods, wooden wares, and brandy. The duchy joined the North German confederation in 1866, where it had one vote, which it also has in the empire. The local legislature or diet consists of one chamber with 30 members. The present duke, Ernest, who succeeded his father in 1853, is a general in the Prussian and a major general in the Saxon army. In former times the duchy belonged to the Osterland, and was ruled by the margraves of Pleissen. In 1803 it was divided into two principalities. In 1826 it assumed its present territorial form. The inhabitants are chiefly Wends by descent, and many in the rural districts retain the antique costumes. **II.** A city, capital of the preceding duchy, situated on the Pleisse, 24 m. by railway S. of Leipsic; pop. in 1871, 19,966. It is well built, and contains many churches, a museum of painting and statuary, a gymnasium, and a great number of educational and literary institutions. The most celebrated public building is the palace, situated on an escarped rock. Altenburg has manufactories of cigars, gloves, brushes, and haberdashery, and an important book trade. It was for some time an imperial city. In 1430 it was almost destroyed by the Hussites.

ALTEN-OETTING, or **Alt-Oetting** (the *Aulinga Villa* of the middle ages), a small town in one of the most beautiful and fertile valleys of Upper Bavaria, 50 m. E. N. E. of Munich, and 2 m. S. of Neu-Oetting on the Inn; pop. about 2,500. It is annually frequented, on account of its famed picture of the Virgin, by many thousand pilgrims from Austria, Bavaria, and Swabia. The Jesuits had a college here, which was suppressed in 1773. In its place the Redemptorists founded a college in 1841, which is the principal house of the order in Germany. Alten-Oetting was in the 9th century long the residence of Carloman, the eldest son of Louis the German. Several German emperors, among whom are Henry III. and Henry IV., held their court here. Tilly is here buried with other members of his family, and the chapel which contains his tomb bears his name. Since Maximilian I. many princes and princesses of the Bavarian house have been entombed here.

ALTENSTEIN, a mountain castle in Saxe-Meiningen, not far from Eisenach, on the S. W. slope of the Thuringian Forest. It was the residence of Boniface, the apostle to the Germans, in the 8th century, and just behind it is the place where Luther was secreted by the elector Frederick the Wise in 1521. The names of "Luther's beech" and "Luther's spring" perpetuate the memory of the reformer's retirement in this place. The tree stood till 1841, when it was shattered by a tempest, and a part of its fragments are preserved in the church of Steinbach; a small monument marks the place where it stood. Since 1798 Altenstein has been the summer residence of the court, and has been surrounded by a splendid park. In 1799 a grotto was here discovered, which is among the most remarkable natural curiosities of Germany. It is of vast proportions, and through its whole extent flows a rapid stream of water sufficiently deep to bear barges, and turning a mill at the place where it issues from the earth. The entrance to the cavern is through a subterranean gallery.

ALTENSTEIN, Karl, baron von Stein zum Altenstein, a Prussian minister of state, born in Anspach, Oct. 7, 1770, died in Berlin, May 14, 1840. He was called by Hardenberg into the ministry at Berlin in 1799. During the war of 1806 he fled with the court from Berlin to Kōnigsberg, and after the treaty of Tilsit became the head of the department of finance. He took a principal part in the foundation of the university of Berlin in 1809. In 1815 he was sent with Wilhelm von Humboldt to Paris, to present the claims of Prussia for the restoration of the treasures of art and literature carried from the country by the French armies; and in the same year he was made a member of the commission for determining the boundaries of the Prussian possessions in Westphalia and in the province of the Rhine. After his return to Berlin he was made minister of public worship and education, and in this position he rendered lasting service to the universities, gymnasiums, and schools. Under his direction the university of Bonn was founded, and reforms were introduced into the several branches of popular instruction. He was a zealous partisan of the philosopher Fichte.

ALTERATIVES, a term applied by modern writers on medical science in a somewhat obscure manner. A certain class of substances are denominated "alteratives" in manuals of therapeutics. The effects produced by these substances, administered in comparatively small and frequent doses, are practically known, but the *modus operandi* is a mystery. As the same substances in large doses act as emetics, purgatives, or poisons, a name was required to designate the peculiar effects of these substances administered in minute doses; and the most appropriate word that could be found, apparently, was the word "alterative." As the manner of action of drugs in health and disease becomes more accurately known, the medicines thus designated will undoubtedly be removed to other classes, or this name will be replaced by something more rational and definite. It is probable that some alteratives act either by modifying the character of the nutritive material carried by the blood to the tissues, or by promoting the destructive metamorphosis of tissue outside the blood vessels. In these processes, diseased tissues, being the more weakly organized, experience the earliest effects, and in this way the good may be obtained without the evil. The principal substances used as alteratives are iodine and mercury, and their respective combinations with potassium and other substances. Arsenical preparations are also used as alteratives in small doses. They are mostly employed in chronic diseases and cutaneous, scrofulous, and syphilitic affections. Many other substances are now used as alteratives in small doses, the effects being more or less immediate and temporary, or slow and lasting, according to the dose administered. Any powerful medicine given in frequent small doses may be called an alterative, therefore, as it acts continuously, gently, slowly, and, when well selected, often most efficiently. Each medicinal substance acts in proportion to the frequency and potency of the dose administered, when given alone, or with a neutral menstruum, such as mucilage or water. Ten grains of ipecacuanha, taken alone or in water, act as an emetic; but combined with a strong dose of opium (two grains of good quality, or three of an inferior kind), the ipecacuanha will not produce an obvious effect upon the stomach, but be absorbed into the blood and cause a profuse flow of perspiration, if the patient be kept warm in bed. Arsenic is a violent poison in large doses; in minute doses, frequently repeated, it is a cure for ague and fever. Many of the most active and poisonous preparations of mercury are highly beneficial in small doses, although dangerous in large ones.

ALTERNATE GENERATION. See Jelly Fish.

ALTHÆA (Gr. ἀλθεῖν, to cure), a genus of plants belonging to the natural order *malvaceæ*. They have a double calyx, the outer whorl with from 6 to 9 sepals, and the inner with 5. *A. officinalis* is the marsh mallow, the knowledge of which in medical botany is of great antiquity. The mucilaginous roots and leaves of this plant are used in all cases in which emollient or demulcent substances are required. It is a perennial plant, with a white, fleshy root, 12 or 15 inches long. The stems are 2 or 3 feet high, and covered all over with a soft down. The leaves are also covered with down, which gives the whole plant a hoary aspect. The leaves are soft and stalked, the flowers of a pale rose color, appearing in very short clusters from the axil of the leaves. The corolla is like that of the common mallow. The demulcent lozenges sold under the name of *pâté de guimauve* are made of *A. officinalis;* they are made in large quantities in the south of France, particularly at Marseilles. The hollyhock, *A. rosea*, grows wild in China. (See Hollyhock.)—Althæa is a common name of the ornamental shrub *hibiscus Syriacus*, also called rose of Sharon. (See Hibiscus.)

ALTHEN, Ehan, a Persian who introduced madder into France, born in 1711, died in 1774. He was sold to an Anatolian planter, who for 14 years kept him working on cotton and madder. On effecting his escape from slavery, he found his way from Smyrna to Marseilles and

Avignon, where the soil seemed to him favorable to the growth of madder. He failed to interest the public mind in favor of his plan, but a French lady, Mme. de Clausenette, consented to plant the seeds which he had brought with him from Smyrna. The experiment was successful and extensively imitated, but Althen, who had thus conferred a great benefit upon France, was left to die in the greatest penury; and on the same day that the honor of a monument in the Calvet museum at Avignon was paid to him by the French authorities, his only daughter died in despair at the hospital.

ALTHORP, Viscount. See SPENCER.

ALTITUDE, the scientific or technical word for height. The altitude of a triangle is the distance from either corner of the triangle to the opposite side, when that side is considered as the base of the triangle. The altitude of a cone or a pyramid is the height of its vertex above the plane on which it stands. The altitude of a star is its height above the horizon. This altitude is measured in degrees, a star in the zenith having the greatest possible altitude of 90 degrees. Apparent altitude is that which the star or other heavenly body appears to have, from which the true altitude is obtained by making allowance for the various errors arising from the refraction of the air, the height of the observer, the distance of the body from the earth, &c.

ALTKIRCH, a town of the new German department of Upper Alsace, on the Ill, 16 m. E. of Belfort, France, and 70 m. S. of Strasburg; pop. about 3,200. It is a manufacturing town of some importance, and contains a fine modern church and a ruined castle, which in former times was occupied by the Austrian archdukes in their visits to Alsace. It was founded in the 12th century, and belonged to the counts of Pfirt (Ferrette). The German authorities have selected Altkirch as the town to be fortified as a counter-fortress to Belfort.

ALTMÜHL, a river of Bavaria, 150 m. long, rising 7 m. N. E. of Rothenburg in Middle Franconia, and emptying into the Danube at Kelheim, S. W. of Ratisbon. The Ludwig's canal connects it with the Regnitz, an affluent of the Main, thus uniting the North and Black seas through the Rhine and Danube.

ALT-OETTING. See ALTEN-OETTING.

ALTON, a city and port of entry of Madison county, Ill., on the left bank of the Mississippi river, 3 m. above the mouth of the Missouri, about 20 m. below the mouth of the Illinois, and 25 m. N. of St. Louis, Mo.; pop. in 1860, 6,332; in 1870, 8,865. Its length along the river is about 2¾ m.; its average breadth about 1½ m. A little W. of the centre it is divided by a small stream called Piasa creek, which has its sources in springs within and near the city limits, and is arched over and used as a main sewer. The valley of this stream and the bottom land W. of its mouth along the Mississippi are the chief seats of business. Each side of this valley and up and down the river from it the ground rises rapidly and in some parts abruptly into irregular and broken bluffs, the highest being 224½ feet above the river. The whole city is underlaid with limestone rock, which is full of fissures and caves, crops out in many places, and in the western part along the river forms perpendicular bluffs. Alton is the centre of a rich farming country. Besides the river navigation, three railroads connect it with all parts of the country. The principal manufacturing establishments (1872) are two large flouring mills, two iron founderies, an extensive woollen mill, glass works, a castor oil mill, a large tobacco manufactory, a manufactory of agricultural implements, a planing mill, and several lumber yards and steam saw mills. The packing business is carried on, but less extensively than formerly. Lime of excellent quality is made, and, with building stone, is exported largely. There are two banking houses, gas works, and a steam ferry to the opposite shore. There is a large Roman Catholic cathedral, Alton having been made a bishopric in 1868. The other churches are: one Baptist, one orthodox Congregational, one Unitarian, two Protestant German, one Presbyterian, one Cumberland Presbyterian, one Methodist, one Catholic, and one colored Baptist. Alton has a daily and weekly newspaper, a weekly paper in German, and a weekly religious journal, the "Cumberland Presbyterian," the organ of that denomination in the West. There are several benevolent societies and a library association. The state penitentiary, established here in 1827, was removed several years since to Joliet. The buildings are yet standing, and were used during the civil war as a government prison. Upper Alton, about 1½ m. E., is the seat of Shurtleff college, a Baptist institution. (See SHURTLEFF COLLEGE.) In 1807 there was one small building where Alton now stands, used by the French of Cahokia and St. Louis as a trading house with the Indians. The town was laid out in 1817.

ALTON, an Austrian noble family, of Irish descent. I. **Richard,** count d', a general, born in Ireland in 1732, died in Treves, Feb. 19, 1790. He entered the Austrian service very young, rapidly rose to high rank, and in 1788 became Feldzeugmeister. In November, 1787, he was appointed to the command of the Austrian Netherlands, then in insurrectionary ferment. His harsh measures provoked the first bloodshed at Brussels, June 22, 1788. After the victory of the patriots at Turnhout, Oct. 27, 1789, he gave the order to destroy all rebellious places; but in December, after the outbreak in Brussels, he retreated to Luxemburg, and was recalled to Vienna, but died on the way thither. II. **Edward,** count d', brother of the preceding, also a general, born in Ireland in 1737, died Aug. 24, 1793. He distinguished himself in the seven years' and Turkish wars. In 1792 he was imprisoned for writing in defence of his brother's conduct, but afterward commanded a division at the siege of Valenciennes and a corps at that of Dunkirk, where he was killed. **III. Johann Wilhelm Eduard d',** a German naturalist, born in Aquileia in 1772, died in Bonn, May 11, 1840. He was educated at Vienna, visited Italy, and lived for a long time in the grand ducal park at Tieffurt, near Weimar, where he devoted himself to the study of the fine arts and natural history, especially of the horse. In 1817 and 1818, in company with his friend Pander, he explored France, Spain, Portugal, and Great Britain, for scientific purposes. On his return he became professor of archæology and fine arts at the university of Bonn. He left a fine collection of paintings and engravings, part of which were purchased by the university and part by Prince Albert, who was one of his Bonn pupils. D'Alton is the author of works on the "Natural History of the Horse" and "Comparative Osteology," accompanied with many superb plates, engraved by himself. He took an active part in Döllinger's and Pander's investigations on the development of chickens in the egg. **IV. Johann Samuel Eduard,** son of the preceding, born at St. Goar, July 17, 1803, died in Halle, July 25, 1854. In 1834 he was appointed professor of anatomy and physiology at Halle. He continued the "Comparative Osteology" of his father, and published between 1827 and 1838 two volumes on the ostrich and birds of prey. In 1850 he published the first volume of his manual of the "Comparative Anatomy of Man." In 1853 he published *De Monstris, quibus Extremitates Superfluæ suspensæ sunt,* and in 1854, in concert with Burmeister, *Der fossile Gavial von Boll in Würtemberg.*

ALTONA, the most important city of the duchy of Holstein, North Germany, situated on the right bank of the Elbe, below and immediately adjoining Hamburg, and for commercial purposes forming with it a single town; pop. in 1871, 74,131. It is well built, is a free port, and enjoys privileges favorable to its trade and prosperity. It was set up by Denmark as a rival to Hamburg, and passed with Holstein into the possession of Prussia in 1867. It has six churches, a gymnasium with a library of upward of 20,000 volumes, an orphan hospital, an infirmary, a college, an observatory, and a mint. It has an extensive trade, and very considerable manufactories. The chief manufacture is tobacco. There are also soap and oil works, sugar houses, distilleries, chemical works, rope walks, tanneries, and divers manufactories of cotton, silk, and leather. Its extensive railway and steamboat connections add materially to its importance. Altona was burned by the Swedes, under General Steenbock, in January, 1713, with circumstances of great barbarity.

ALTOONA, a city of Blair co., Penn., 244 m. by railroad W. N. W. of Philadelphia, and 115 m. E. of Pittsburgh; pop. in 1860, 3,595; in 1870, 10,610. It was laid out in 1849, and is situated at the head of Tuckahoe valley and at the foot of the Alleghanies. It is on the line of the Pennsylvania central railroad, to which it owes most of its prosperity; the workshops of the company situated here are the most extensive in the state. The city contains 11 churches, a high school, 2 banks, 6 hotels, and 3 daily newspapers. At Altoona the western-bound traveller begins the ascent of the Alleghanies. In the course of the next 11 m. some of the finest views and the greatest achievements of engineering skill on the entire line are to be seen. Within this distance the road reaches the summit by so steep a grade that, while in the ascent double power is required to move the train, the entire 11 m. of descent are run without steam, the speed of the train being regulated by the brakes. The summit of the mountain is pierced by a tunnel 3,670 feet long. On the eastern slope is the famous "horse-shoe bend," formed by a very short curve in the road around the brink of a precipitous descent.

ALTORF, or **Altdorf,** capital of the canton of Uri, Switzerland, in a deep, narrow valley on the Reuss, near the S. E. extremity of Lake Lucerne, at the N. E. terminus of the St. Gothard road; pop. in 1870, 2,724. It is neatly built, and has a Capuchin convent and an old tower covered with paintings in honor of William Tell, which is popularly believed to occupy the spot where he shot the apple from his son's head, though recent research has proved it to be of a date anterior to the time in which that hero of the Swiss legends figures.

ALTO-RILIEVO, a term designating that species of sculpture in which the figure stands completely out from the ground, being attached to it only in some places, and in others worked entirely round like single statues; such are the metopæ of the Elgin marbles in the British museum. Donatello's alti-rilievi at Florence are among the most perfect examples of this sort of art. The largest work ever executed in alto-rilievo is that by Algardi in St. Peter's at Rome, representing the repulse of Attila by St. Peter and St. Paul.

ALTURAS, a S. county of Idaho, bordering on Montana, and bounded S. and S. E. by Snake river; pop. in 1870, 689, of whom 314 were Chinese. The Salmon river, a branch of the Columbia, is the principal stream. The N. part of the county is occupied by the Rocky mountains. There are 9 quartz mills.

ALUM, a name given to a remarkable series of double salts, of which potash alum may be taken as the type. The alums are more or less soluble in water, crystallize in regular octahedra, and differ from the normal compound in the fact that the alumina and potash are replaced in whole or in part by their isomorphs. We can replace the alumina by the sesquioxide of iron, of manganese, or of chromium, and the potash by soda, the oxide of ammonium, the oxides of ammonium compounds, the oxides of rubidium, cæsium, and thallium. Lithia is the only one of the alkalies that does not form an alum. Selenic acid, isomorphous with sulphuric acid, and (it is believed) telluric acid, can be substituted for sulphuric acid in the composition of alums. The following is a list of alums actually known to chemists, together with their chemical formulas: 1. Ordinary potash alum, $(SO_4)_3Al_2 + SO_4K_2 + 24H_2O$. 2. Soda alum, $(SO_4)_3Al_2 + SO_4Na_2 + 24H_2O$. 3. Ammonia alum, $(SO_4)_3Al_2 + SO_4(NH_4)_2 + 24H_2O$. 4. Rubidium alum, $(SO_4)_3Al_2 + SO_4Rb_2 + 24H_2O$. 5. Cæsium alum, $(SO_4)_3Al_2 + SO_4Cs_2 + 24H_2O$. 6. Thallium alum, $(SO_4)_3Al_2 + SO_4Tl_2 + 24H_2O$. 7. Manganese alum, $(SO_4)_3Mn_2 + SO_4K_2 + 24H_2O$. 8. Chrome alum, $(SO_4)_3Cr_2 + SO_4K_2 + 24H_2O$. 9. Chrome-ammonium alum, $(SO_4)_3Cr_2 + SO_4(NH_4)_2 + 24H_2O$. 10. Iron alum, $(SO_4)_3Fe_2 + SO_4K_2 + 24H_2O$. 11. Iron-ammonium alum, $(SO_4)_3Fe_2 + SO_4(NH_4)_2 + 24H_2O$. 12. Thallium-iron alum, $(SO_4)_3Fe_2 + SO_4Tl_2 + 24H_2O$. 13. Selenic alum, $(SeO_4)_3Al_2 + SeO_4K_2 + 24H_2O$. To this list may be added alum of trimethylamine, alum of ethylamine, alum of methylamine, and alum of amylamine.—The history of alum dates back to a remote antiquity. Pliny in his *Historia Naturalis* mentions several kinds of *alumen*, and says that a black and a white occur in Cyprus, the former being used for dyeing dark wool and the latter for light fabrics. As he afterward says that *alumen liquidum* is colored black by nut galls, he either refers to an impure alum or confounds the substance with sulphate of iron or green vitriol. It is, however, safe to assume that the *στυπτηρία* of the Greeks and the *alumen* of Pliny have reference to impure varieties of what is now called alum. It was manufactured some centuries since at Racca in Mesopotamia, whence Leibnitz traced the name *alumen roccæ*, or rock alum. In the 13th century the business was established near Smyrna, and in 1248 extended to Italy, where it was protected against foreign importations by the pope. From thence it spread over Germany, and in the reign of Queen Elizabeth was undertaken in England by Thomas Chaloner, and successfully prosecuted notwithstanding the anathemas of the pope. At first only potash alum was manufactured, but since the introduction of ammonia as a refuse product in the production of illuminating gas large quantities of ammonia alum have been made. The more recent development of the potash deposits of the Stassfurt mines has again brought back the production of potash alum to the first rank, and its manufacture is now conducted on an immense scale.—Potash alum occurs ready formed in nature, especially among volcanic rocks near Naples, on the Rhine, on the island of New York, and in numerous other localities. Where the quantity is sufficient to pay for the trouble, the decomposed rock is leached and the resulting liquor left to crystallize; but only a very small proportion of the alum of commerce is obtained in this way. There are three classes of raw material from which potash alum is manufactured: 1. Such as contain the constituents of alum in the native state; *e. g.*, native alum, alum stone, alum slates. 2. Such as only contain sulphate of alumina, and require the addition of an alkali; *e. g.*, a majority of the alum slates, alum earths, clay, and pyritous bituminous shales. 3. Such as only contain the alumina and require the addition of both the sulphuric acid and the alkali; *e. g.*, clay, cryolite, bauxite, and feldspar. By far the greater proportion of alum is made from alum earths and shales, although the employment of clay, cryolite, and feldspar is on the increase. The mineral alum stone or alunite forms seams in trachytic and allied rocks, where it has been formed as a result of the alteration of the rock by means of sulphurous vapors. It is met with at Tolfa near Civita Vecchia, at Montioni in Tuscany, in Hungary, and in other localities. The compact varieties of Hungary are so hard as to admit of being used for millstones. It was first observed at Tolfa in the 15th century, by J. de Castro, a Genoese, who had been engaged in the manufacture of alum from an alum stone or "rock alum" found near the Euphrates. The composition of alunite is very variable. One specimen from Tolfa was found to contain sulphuric acid 35·50, alumina 39·65, potash 10·02, and water 14·83. It is only when the alunite has been heated to 450° C. that the alum can be extracted from it by water. The stone is roasted in heaps on calcining kilns until it begins to give off sulphurous acid fumes, when the operation is suspended. The calcined material is then placed in troughs of masonry and sprinkled with water until it forms a slimy paste; this is leached in shallow pans with hot water, the lye concentrated and crystallized. Roman alum has a reddish hue, and has long been preferred on account of its freedom from soluble foreign substances. Much of what is now called Roman alum is colored red by the addition of brick dust. Most of the alum of commerce is made by the calcination of aluminous schists, which are argillaceous rocks, containing considerable quantities of sulphide of iron. This is converted by exposure to the air into ferrous sulphate and free sulphuric acid, $FeS_2 + O_7 + H_2O = FeSO_4 + H_2SO_4$; and the sulphuric acid, acting on the alumina contained in the clay, forms sulphate of aluminum. These aluminous schists are found in two different geological positions, viz.: in the transition strata (alum slate), in which position they are largely impregnated with bitumen; and in the lower tertiary strata, just above the chalk (alum earth). The latter are much less compact than the former; consequently their oxidation is easier, and sometimes takes place spontaneously.—The most extensive alum manufactory in Great Britain (1871) is at Hurlett, near Paisley. The next in magnitude is at Whitby, of whose state and processes an instructive account was published by Mr. Winter in the 25th volume of "Nicholson's Journal." The stratum of aluminous schist is about 29 miles in width, and is covered by strata of alluvial soil, sandstone, ironstone, shell, and clay. The alum schist is generally found disposed in horizontal laminæ. The upper part of the rock is the most abundant in sulphur, so that a cubic yard taken from the top of the stratum is five times more valuable than the same bulk 100 feet below. If a quantity of the schist be laid in a heap and moistened with sea water, it will take fire spontaneously, and continue to burn till the whole inflammable matter is consumed. Its color is bluish gray; sp. gr. 2·48. It imparts a bituminous principle to alcohol. The rock, broken into small pieces, is laid on a horizontal bed of fuel, composed of brushwood, &c. When about four feet in height of the rock is piled on, fire is set to the bottom, and fresh rock continually poured upon the pile, until the calcined heap is raised to the height of 90 or 100 feet. Its horizontal area is at the same time progressively extended, till it forms a great bed nearly 200 feet square, having about 100,000 yards of solid measurement. The rapidity of the combustion is allayed by plastering up the crevices with small schist moistened; but notwithstanding this precaution, a great deal of sulphuric or sulphurous acid is dissipated. One ton of alum is produced from 130 tons of calcined schist; this result has been deduced from an average of 150,000 tons. The calcined mineral is digested with water in pits usually containing about 60 cubic yards. The liquid is drawn off into cisterns, and afterward pumped up again upon fresh calcined "mine." This is repeated until the specific gravity becomes 1·15. The half exhausted schist is then covered with water to take up the whole soluble matter. The strong liquor is drawn off into settling cisterns, where the sulphate of lime, iron, and earth are deposited. At some works the liquid is boiled, which aids its purification. It is then run into leaden pans 10 feet long, 4 feet 9 inches wide, 2 feet 2 inches deep at one end, and 2 feet 8 inches at the other. This slope facilitates the emptying of the pans. Here the liquor is concentrated at the boiling heat. Every morning the pans are emptied into a settling cistern, and a solution of chloride of potassium (either pretty pure from the manufacturer, or the crude compound from the soap boiler) is added. The quantity of chloride necessary is determined by a previous experiment in a basin, and is regulated for the workmen by the hydrometer. By this addition, the pan liquor, which had acquired a specific gravity of 1·4 or 1·5, is reduced to 1·35. After being allowed to settle for two hours, it is run off into the coolers to be crystallized. At a greater specific gravity than 1·35, the liquor, instead of crystallizing, would on cooling solidify in a magma resembling grease. After standing four days, the mother waters are drained off, to be pumped into the pans on the succeeding day. The crystals of alum are washed in a tub and drained. They are then put into a lead pan, with as much water as will make a saturated solution at the boiling point. Whenever this is effected, the solution is run off into casks. At the end of 10 or 16 days the casks are unhooped and taken asunder, when the alum is found exteriorly in a solid cake, but in the interior cavity in large pyramidal crystals, consisting of octahedrons, inserted successively into one another. This last process is called "rocking." Mr. Winter says that 22 tons of chloride of potassium, or an equivalent of 31 tons of the black ashes of the soap boiler or 73 of kelp, will produce 100 tons of alum. Where much iron exists in the alum ore, the alkaline chloride, by its decomposition, gives rise to an uncrystallizable chloride of iron. For this reason it is preferable to the sulphate of potassium. —Alum may also be obtained from cryolite by heating the mineral with three times its weight of strong sulphuric acid, whereby anhydrous neutral sulphate of aluminum and acid sulphate of sodium are obtained; treating the resulting mass with a small quantity of cold water to remove the acid sodium salt; then digesting the anhydrous sulphate of aluminum with warm water, to convert it into the hydrated salt, and adding the proper quantity of sulphate of potassium. As the alum from cryolite is remarkably free of iron, it is highly prized by many manufacturers.—The discovery of an aluminous earth in the neighborhood of Baux, France, and hence called bauxite, has added to the class of materials for the manufacture of alum. To this the addition both of sulphuric acid and of a salt of potash is necessary. Bauxite is extensively employed in the manufacture of the sulphate of alumina (alum cake) and of the metal aluminum.—At the chemical works of Harrison Brothers, Philadelphia, ammonia alum is manufactured from a pure clay mostly obtained from New Jersey. The clay is dried and then ground and calcined in a reverberatory furnace. When thoroughly calcined and purified, it is while hot digested for some hours in sulphuric acid contained in large vats. The product is washed with water and concentrated, sulphate of ammonia having been previously introduced, and it is further purified by redissolving, then boiled by steam, and finally transferred to the crystallizing tubs. These are about eight feet high, and made of strong staves. At the end of eight or ten days, the staves of the tub being removed, a cylindrical mass of apparently solid alum is revealed. This being pierced near the bottom, the mother water at the centre flows off along the sloping floor into leaden subterranean cisterns, whence it is subsequently pumped and variously utilized. Each crystallizing vat yields about 21 barrels of alum ready for market.—The composition of pure potash alum is:

Potash	per cent.	9·89
Alumina	"	10·94
Sulphuric acid	"	33·68
Water	"	45·49
		100·00

or,

Sulphate of potash	per cent.	18·31
Sulphate of alumina	"	36·21
Water	"	45·48
		100·00

Its specific gravity is 1·724. It is soluble in 18 parts cold water and in equal weight of boiling water. It consequently rapidly crystallizes out of a hot saturated solution. Alum has a sweet astringent taste, an acid reaction, and, like sulphuric acid, dissolves many metals, for example iron and zinc, with evolution of hydrogen gas.—Burnt alum, or dried alum, is made by gently heating alum till the water is driven off. Ammonia alum readily loses all its ammonia when heated, and the sulphuric acid may be driven off the remaining sulphate, so that the pure earth alumina will remain.—The employment of alum in medicine and the arts is very extensive. It precipitates albuminous liquids and combines with gelatine. It causes dryness of the mouth and throat, and checks the secretions of the alimentary canal, producing constipation, and in large quantities nausea, vomiting, and purging. Its principal use is in dyeing. The goods are mordanted with it and put in the dye, when the colors are precipitated and fixed in the texture of the cloth by the alumina. Alum is added to the size in the manufacture of paper to prevent decomposition, and also to bookbinders' paste for a similar purpose. Baths of alum are used in the tanning of leather, and it is applied in the printing baths of photographers. It has also been employed in refining sugar and in the manufacture of pigments called lakes. The leather of Hungary is made by impregnating strong hides with alum, common salt, and suet; and in the coloring of morocco the puce tint is communicated by logwood with a little alum. When alum is added to tallow, it makes it harder. Printers' cushions and the blocks used in the calico manufactory are rubbed with burnt alum to remove any greasiness which might prevent the ink or color from adhering. Water can be purified by means of alum; the mud that water holds in suspension collects on the addition of 0·001 part of alum (this is equal to seven grains per gallon) in long thick streaks, coagulates as it were, and is immediately precipitated. This process, the principle of which is inexplicable, was first introduced by the Chinese, and has been imitated in various parts of the world. The operation was well known from a very early period in the highlands of Scotland, according to Dr. Clark, where it is practised with peat water. The Parisian laundresses use it, but it has not been introduced into any of the establishments for the purification of drinking water, partly because alum is a substance never naturally combined in water, and may be received as a real impurity, and partly on account of public prejudice. In bottling fruits for preservation, alum water is used. A novel application of alum is seen in the lining of some iron safes with a mixture of alum and sulphate of lime; as the alum contains 24 equivalents of water, when the safe is heated it keeps the sides cool from the evaporation of the water, the contents of the safe remaining uninjured. It is used in the manufacture of bread to increase the whiteness of the flour. According to Liebig, this is very injurious, as he supposes the soluble phosphates to combine with the alumina, forming insoluble salts, and the beneficial action of the phosphorus is lost to the system. In the manufacture of lard alum is used as an adulterant. Dr. Hassall says that alum is generally put into the vat in breweries to give the beer a smack of age; it also imparts a heading to porter, which landlords are so anxious to raise to gratify their customers. Alum dissolved in water is used in the adulteration of gin; and it is added to artificial port wine, to increase the brilliancy of the color.

ALUMINA, the only known oxide of aluminum. It occurs colorless as corundum, and colored by traces of oxide of chromium and cobalt in the ruby and sapphire. It is found in a few places in larger quantities in the form of emery, which is nearly pure alumina. It is very widely disseminated in nature in combination with other bases in the form of double silicates, constituting feldspars, micas, and a large series of important minerals, from the decomposition and disintegration of which clays are composed. It forms the greater portion of the crust of the earth, and, in the form of clay, affects the fertility of every soil. It is not taken up by plants, except in rare cases, nor is it found in the animal kingdom. There has recently been discovered a mineral in the vicinity of Baux, France, to which is applied the name bauxite. It differs materially from clay in being simply a hydrated oxide of alumina and iron without any silica. It is entirely infusible, and crucibles and fire brick made of it remain unchanged when ordinary fire-clay material loses shape and partially fuses. It is extensively employed in the manufacture of sulphate and other salts of alumina, and of the metal aluminum. When perfectly pure, bauxite is composed of sesquioxide of alumina 52·00, sesquioxide of iron 27·60, and water 20·40; but its composition varies considerably, and some varieties contain small quantities of silica and lime. It differs especially from kaolin in not being a silicate but an oxide of alumina. Well known minerals analogous to it are gibbsite and diaspore.—Alumina may be prepared by adding ammonia to any of its soluble salts (alum for instance), when a gelatinous precipitate of the hydrate of alumina is thrown down, having the formula, according to the present chemical theories, of $Al_2H_6O_6=Al_2O_3, 3H_2O$, after being dried in the air. To obtain it more dense and free of iron, it is now customary to pass carbonic acid gas through a dilute and cold solution of aluminate of soda, prepared in the United States from the mineral cryolite, which is brought from Greenland to be used in the manufacture of glass and soap. The pure anhydrous alumina is prepared by the calcination of the hydrated oxide obtained as above described, or by exposing ammonia alum to a lively red heat. A peculiar modification of alumina is obtained, according to Walter Crum, by long-continued boiling of acetate of alumina; the acetic acid is liberated, and there remains a hydrated oxide soluble in water. A second modification of soluble alumina was discovered by Professor Graham, which can be obtained by the dialytic decomposition of a solution of hydrate of alumina in chloride of aluminum; it has properties differing from either of the other forms.—*Properties of alumina.* When pure it is a white, light powder, devoid of taste and odor, infusible excepting before the oxyhydrogen blowpipe, when it constitutes a viscous fluid that can be drawn in strings like melted quartz, and on cooling yields a crystalline mass sufficiently hard to scratch and cut glass. Calcined alumina is absolutely insoluble in water, but if it has not been heated to redness it combines with a certain portion of water with disengagement of heat. Hydrated alumina is white when moist, but becomes translucent by desiccation, and sometimes yellow if it has been precipitated in the presence of organic matter. Its affinity for coloring matter is so great that it readily absorbs the organic dyes from solutions, and has extensive application as a mordant, as a clarifying agent, and in the manufacture of lakes. The hydrate of alumina after calcination is soluble only with difficulty in acids, but readily soluble when freshly precipitated. The hydrates, prepared according to the methods of Crum and Graham, are soluble in water and possess characteristic properties. Several of the metallic oxides, as soda and potash, if fused in a silver crucible with alumina, combine with it and form aluminates. The minerals corundum, sapphire, and ruby have been made artificially by Deville and Caron, by heating the fluoride of aluminum in a carbon crucible, underneath which is suspended a platinum capsule containing boracic acid; at an elevated temperature the fluorine reacts on the boracic acid and yields a fluoride of boron and a crystalline metallic oxide. By adding variable quantities of sesquioxide of chromium, good imitations of the ruby, sapphire, and corundum can be obtained; and it is said that Bonsdorf has made the mineral gibbsite by exposing a solution of aluminate of potash to the action of an atmosphere of carbonic acid. When metallic aluminum is heated to redness in the air or in oxygen gas, it burns brightly and is converted into alumina, 53·3 parts of the metal taking up 46·69 parts of oxygen to form the pure earth. The compound thus produced is inferred to be sesquioxide because it is isomorphous with the sesquioxides of iron and chromium, and is capable of replacing these oxides in combination in any proportion.

ALUMINUM, or **Aluminium,** one of the metals of the earths never found native, but occurring in combination with other elements in 195 different species of minerals, and consequently constituting a large part of the solid crust of the earth. Among the minerals and rocks containing this metal may be mentioned the following: ruby, sapphire, corundum, emery, gibbsite, bauxite, turquoise, lapis lazuli, topaz, cryolite, feldspar, clay, and slates. Although so abundant, it is only within a few years that the metal has been prepared in a free state, and even at the present time the manufacture is too expensive to admit of its common use in the arts. Davy, Berzelius, and Oersted attempted to decompose the oxide by means of the electric current, but without success. Oersted, who discovered the chloride, failed in his efforts to decompose this salt by metallic alkalies. It was first prepared in 1827 by Wöhler, who obtained a gray metallic powder on decomposing the chloride with potassium under a gentle heat. In 1845 Wöhler obtained it in the form of a metallic button by passing vaporized chloride of aluminum over heated potassium. Its chemical and physical properties were then determined, and the subject allowed to rest till 1854, when it was a second time discovered by Deville. He heated the crude chloride of aluminum in an upright iron cylinder, connected by a pipe with a smaller horizontal cylinder containing iron nails, which reduced any perchloride of iron present to the less volatile protochloride, and also detained any hydrochloric acid or chloride of sulphur present. The vapor of aluminum chloride passed next through a long wrought-iron cylinder containing three dishes holding a pound of sodium each, and heated on the lower side to dull redness. The reaction is sometimes so violent as to require a careful regulation of the heat. Metallic aluminum is formed along with the double chloride of sodium and aluminum. This mass is then heated in an iron vessel or clay crucible until it is entirely melted and the double salt begins to evaporate. When cold the chloride of sodium found on top is removed, the buttons of aluminum are washed with water, dried, and heated to redness, when they may be pressed together. The loss of aluminum by this process is very considerable. The method was afterward abandoned, and the following mixture employed: chloride of aluminum and sodium, 400 grammes; common salt, 200; fluor spar, 200; sodium, 75 to 80. The double salt is previously fused and heated almost to redness, the common salt fused or strongly ignited, the fluor spar powdered and well dried. The double salt and common salt are broken up into a coarse powder, mixed with the fluor spar, and placed in a crucible with alternate layers of sodium, the whole being covered with a layer of common salt. It is heated gently at first, then more strongly, until the melting point of silver is nearly but not quite reached. The mass is stirred with a clay pipe stem, and poured out on a dry slab of limestone. The aluminum is readily separated from the slag, and should yield 25 grammes from 75 grammes of sodium. In this experiment the fluor spar should be free from silica, and the sides of the crucible be protected by a layer of alumina prepared from a paste of 4 parts ignited aluminum and 1 part aluminate of lime. The process requires some experience in order to succeed. It is much easier and simpler to employ cryolite instead of fluor spar. In 1855 H. Rose in Berlin, and Dr. Percy in England, prepared aluminum from cryolite. The pulverized mineral was mixed with half its weight of common salt, and the mixture arranged in alternate layers with sodium (2 parts sodium to 5 parts cryolite), in an earthen or iron crucible covered with a layer of pure cryolite, and the whole covered with common salt. The crucible, well covered, is heated to a bright red heat by means of a blast lamp for half an hour, then allowed to cool, and the contents removed with a chisel, at the same time tapping the crucible with a hammer. In 1858 Gerhard invented and patented an improvement, consisting in the use of a reverberatory furnace with two hearths, one above the other, communicating by an iron pipe. In the lower is placed the mixture of sodium with the aluminum compound, and in the upper a stratum of common salt, or of a mixture of sodium and cryolite, or of the slag from a former operation. This layer when melted is made to run into the lower furnace in quantity sufficient to cover completely the mixture contained therein, so as to protect it from the air.—Several attempts have been made, but with doubtful success, to separate aluminum from its compounds by means of the ordinary reducing agents, hydrogen and carbon. Johnson has patented the following process: Mix together sulphide of aluminum and anhydrous sulphate of aluminum, in such proportions that the oxygen present is just sufficient to convert all the sulphur into sulphurous acid ($Al_2S_3 + Al_2(SO_4)_3 = 4Al + 6SO_2$). The mixture is heated in a non-oxidizing atmosphere to a red heat. Corbelli of Florence mixes the impure sulphate with 2 parts ferrocyanide of potassium and 1½ of common salt, heating the whole to redness. Knowles decomposes the chloride by means of cyanide of potassium. Bunsen in 1854 obtained aluminum by electrolysis of the fused chloride of aluminum and sodium in a red-hot crucible, ten elements of a Bunsen battery being required. Messrs. Bell Brothers of England commenced producing aluminum a few years since from the ammonia alum of commerce, but afterward employed a native hydrated oxide known as the mineral bauxite. (See ALUMINA.) The bauxite, having first been reduced to fine powder by grinding under an edge-stone, is mixed with a quantity of soda slightly more than is necessary to form aluminate of soda with the alumina of the mineral, and heated in a reverberatory furnace. The aluminate of soda thus produced is afterward decomposed, and furnishes the alumina for further decomposition by means of chlorine and sodium as above described. The electro-galvanic deposition of aluminum, although frequently attempted, does not appear to have been successfully accomplished.—*Properties of aluminum.* Aluminum is a bluish white metal, without odor or taste, nearly as malleable as gold and silver; density of the fused metal 2·50, of the hammered 2·67; melting point between that of silver and zinc; nearly as good a conductor of electricity as silver; does not oxidize in the air, even at a strong red heat; does not decompose water excepting at a white heat; is not blackened by sulphuretted hydrogen. It is not attacked by nitric acid, either dilute or concentrated, at ordinary temperatures, and very slowly even at the boiling heat; neither is it acted upon by sulphuric acid diluted to the degree at which that acid dissolves zinc; but hydrochloric acid, either dilute or concentrated, dissolves it easily even at low temperatures, with evolution of hydrogen. Caustic soda and potash readily dissolve it, forming aluminates of those bases. Ammonia acts but slightly on it. Professor Würtz of New York prepares an amalgam of aluminum by heating thin foil on mercury in a glass tube so drawn out that the foil cannot swim on the mercury. This amalgam is more readily decomposed in the air and in water than sodium amalgam. Aluminum is a powerful reducing agent for solutions of chlorides, and in the preparation of the rare elements boron and silicon. An alloy of aluminum with silver, called third silver (*tiers-argent*), composed of one third silver and two thirds aluminum, is chiefly employed for forks, spoons, and tea service, and is harder than silver and more easily engraved. Another alloy, called *minargent*, is composed of 100 parts copper, 70 parts nickel, 5 parts antimony, and 2 parts aluminum. The beautiful tone of the metal has suggested its use in the manufacture of bells, and a successful application of it for this purpose has been made. Mixed with copper in the proportion of 10 parts of aluminum and 90 of copper, it forms a beautiful alloy known as aluminum bronze, now frequently employed for the manufacture of watch cases, watch chains, imitation jewelry, sheathing for stairs, and bearings of machinery. The alloy of aluminum with iron is crystalline and of no value in the arts. Experiments made in 1865 at the United States mint on alloys of aluminum for coins were not sufficiently successful to induce the government to adopt them. The difficulty encountered in soldering and welding aluminum, and the high cost of its production, have seriously interfered with its extensive application in the arts. It can hardly be said to have fulfilled all the expectations that were raised at the time of the revival in its manufacture introduced in 1855 by Deville.—*Salts of aluminum.* These are very numerous, many of them extensively employed in the arts. Alum and the oxide alumina are separately described. The chloride, Al_2Cl_6, can be prepared by passing dry chlorine gas through a heated mixture of alumina and charcoal. It is a volatile compound, and is used as above described in the manufacture of the metal aluminum. The hydrated chloride of alumina is easily prepared by dissolving aluminum in hydrochloric acid. It is sold in commerce, under the name of chloralum, as a disinfectant and antiseptic, and is also recommended for salting paper in photography. Sulphate of aluminum is known in a crude state as alum cake, and is prepared on a large scale by roasting aluminous shales as described under ALUM. It can be prepared in a small way by dissolving the hydrate of alumina in sulphuric acid. Acetate of aluminum is prepared by precipitating acetade of lead with sulphate of aluminum or with a solution of alum. It is extensively used as a mordant in calico printing, especially in producing madder reds, whence it is called "red liquor."

ALUMNUS (Lat., from *alere*, to nourish), originally the designation of a student who was supported and educated at the expense of the *alumnat*, an institution which, especially after the reformation, was endowed for the particular purpose of extending hospitality and education to youths who could not afford to pay for their living and tuition. Maurice of Saxony endowed three such institutions in Pforte, Meissen, and Grimma, which are to this day in active operation. The alumni have to adhere to the rules of the establishment and to perform various services for the school and the church, such as singing in the choir and the like, while the *extraneers*, the name given to students who pay for their board and tuition, are not bound to perform such services. In ordinary parlance, every graduate of a university or college is now an alumnus.—In jurisprudence, the term alumnat is the generic expression for the general responsibilities attached in the eyes of the law to the relationship of the foster-father (*nutritor*) toward the child whom he has undertaken to support and educate.

ALUNNO, Nicolò, of Foligno, an Italian painter of the 15th century, one of the masters of the Umbrian school, which was the forerunner of the Roman. His earliest known work bears the date of 1458, and his latest that of 1499. His *Pietà* in the cathedral of Assisi, of which only a portion remains, was regarded by Vasari as his master work. His other works are chiefly found in Perugia and Foligno.

ALURED, Alred, or **Alfred of Beverley,** an English historian, died probably in 1129. He is said to have been a native of Yorkshire and one of the canons and treasurer of the church of St. John in Beverley. He left an "Epitome of British History" from the time of the fabulous Brutus to the 29th year of Henry I., written in good Latin, and compiled with a care unusual for that day. It was published by Hearne at Oxford in 1716. The work bears a strong resemblance to that of Geoffrey of Monmouth, both having probably been drawn from the same sources.

ALUTA, Alt, or **Olt,** a northern affluent of the Danube, which rises in the Carpathians of eastern Transylvania, and, after flowing S. and then W., crosses the Carpathians S. of Hermannstadt, traverses Wallachia, and empties near Turna, opposite Nicopolis. Its entire course is about 330 m. Its principal tributary is the Oltetz, in Wallachia.

ALVA, or **Alba, Fernando Alvarez de Toledo,** duke of, a Spanish general and statesman, born in 1508, died Jan. 12, 1582. He was descended from a family which boasted its extraction from Byzantine emperors; and one of his ancestors, a Palæologus, conquered Toledo, and transmitted its appellation as a family name. From his earliest years he was trained to arms, and imbibed a hatred of infidels, which was afterward naturally transferred to those at enmity with the church of Rome. At 16 years of age he fought at Fontarabia, and in 1530 he accompanied the emperor Charles V. in his campaign against the Turks. At this period he seemed like one of the romantic heroes of chivalry. On one occasion he rode as fast as his steed could bear him from Hungary to Spain and back again, merely for a hurried visit to his young bride. In 1535 he took part in Charles's expedition to Tunis. In 1546–'7 he was generalissimo in the war against the Smalcaldian league, winning his greatest honors at the battle of Mühlberg, in which he totally routed the Protestant forces. In 1554 he went with the Spanish crown prince to England, and shortly before that prince's accession to the throne as Philip II. on the abdication of Charles V. was made generalissimo of the army in Italy, engaged in a war with Pope Paul IV. Although he reverenced the successor of St. Peter, he was greatly displeased with Philip for obliging him to make peace with the pontiff, whose capital he had seized. To patience and cunning he united ferocity and a thirst for blood scarcely human; he hardly knew the meaning of pity, though frequently alluding to his clemency in his letters to Philip. The personal appearance of this extraordinary man well merits description. He was tall, thin, erect, with a small head, dark sparkling eyes, cavernous cheeks, and a stern expression, rendered more striking by a long, thin, waving, and silvered beard. In manners he was cold and haughty, and was even more inaccessible than his royal master. The spoliation of the churches in the Netherlands by the iconoclasts had enraged Philip more than any of the other troubles in his Flemish provinces; and their armed invasion having been determined on, 10,000 picked veterans were placed under the command of the duke of Alva. Refused a passage through the French dominions, the force embarked at Cartagena, May 10, 1567, and landed at Genoa. The whole army was under the most perfect discipline, and attached to it was a force of 2,000 prostitutes, enrolled and distributed, doubtless to prevent the troops from any outrages in lands through which lay their march. In three divisions they made their way over Mont Cenis, and through Savoy, Burgundy, and Lorraine, and without the least opposition entered the territory of the Netherlands. Great was the alarm in the disaffected provinces when it was learned that Alva was on his march. William of Orange, who was not to be deceived by any show of clemency, had retired into Germany. The duke's interviews with the duchess of Parma, then regent of the Netherlands, were brief and formal; but in spite of courtly etiquette, neither could well conceal dislike of the other. Margaret, enraged at being superseded, soon took her departure, and Alva was left alone to fulfil his mission. Establishing his headquarters at Brussels, he at once proceeded in his work of vengeance. The "Council of Troubles" was set up, to inquire into and punish all past offences; and so merciless were its labors, that it was styled by the populace the council of blood. Counts Egmont and Horn, the two idols of the people, who had been foremost in asserting the religious liberties of the Netherlands, but who were guilty of no treason, were beheaded in the great square of Brussels, June 5, 1568. The execution of other popular leaders immediately followed; burnings at the stake and decapitation thenceforth were decreed by wholesale, and during the whole period of Alva's six years' administration in the Netherlands blood flowed like water. Throughout the land his name, and those of his terrible subordinates in the blood council, Hessels and Vargas, came to be feared and hated. The least suspicion of any person, however innocent, especially if he was rich, drew down the vengeance of the council; for Alva had promised before he left Spain to enrich the treasury of Philip by a golden river a yard deep, drawn from the confiscated wealth of heretics; he even named 500,000 ducats per annum as the sum. Military operations had begun before the fatal 5th of June. Count Louis of Nassau having invaded Friesland, Alva took measures to oppose him vigorously. At first the count met with some success, and at the battle of Heiligerlee defeated the Spaniards under the duke of Aremberg, who was killed. Alva was roused to fury at the news, and to expiate the loss of the duke beheaded 18 nobles besides hastening the execution of Egmont and Horn, and then left Brussels to meet the count in the field. An attempt to destroy the dikes and inundate the country was frustrated by the arrival of Alva's forces, and at the battle of Jemmingen he utterly routed Louis and destroyed his army. William of Orange persevered, and, mustering another army, sought in vain to bring Alva to an engagement. Twenty-nine times did the prince change his encampment, and as often did the Spanish forces hover in his rear. The duke's skill in the campaign of 1568 was a masterpiece of tactics; he had nothing to gain, the prince everything to hope for, by a battle. The country people of Brabant, the scene of this masterly inactivity, refused the prince supplies; and Alva had caused the irons to be taken out of every mill, so that not a bushel of corn could be ground in the province. Frustrated in his hopes of a battle, William was further dejected by the supineness of the country. Not a single city opened its gates to him; he was forced to quit the Netherlands and disband his army soon after, while Alva erected a colossal bronze statue of himself in the citadel of Antwerp, and ordered a series of magnificent fêtes to be celebrated at Brussels. He was soon engaged in a quarrel with Elizabeth of England, who had seized in her ports $800,000 of Spanish funds. Alva retaliated by ordering the arrest of every Englishman in the Netherlands, and the seizure of all their property; and between the two angry spirits, Flemish prosperity was well nigh annihilated. But the duke was disappointed in his hopes of forcing a golden stream to flow into the king's coffers; with all his abilities as a soldier, he was a wretched financier; and so far from supporting his army on the confiscations of the people, and supplying Philip with gold besides, as he boasted he would, during the six years of his rule twenty-five millions of money were sent to him from Spain, yet he left the Netherlands without a dollar in the treasury. Among his odious schemes were a tax of the hundredth penny, or one per cent., on all property, real and personal, to be paid instantly and collected once; a perpetual tax of the twentieth penny, or 5 per cent., on every transfer of real estate; and a tax of the tenth penny, or 10 per cent., assessed upon every article of merchandise or personal property, to be paid as often as it should be sold. No sooner was this monstrous imposition declared than every one in the land excepting the duke himself perceived how utterly abortive and ridiculous a scheme it would prove. The towns rebelled, and examples by dozens were made of refractory citizens to no purpose. The king was petitioned, and finally, after all the severity of Alva, a temporary compromise was effected, by which the towns were to pay $2,000,000 yearly for the two following years, that is, until the month of August, 1571. At length universal revolt was manifested. The shops were all closed; "the brewers refused to brew, the bakers to bake, the tapsters to tap." Alva thereupon resolved to hang 18 of the tradesmen of Brussels at the doors of their own shops, without trial. This summary work was prevented, however, by the news of the capture of Briel by the "Water Beggars," adherents of the prince of Orange. The revolution and capture of Flushing soon followed, and the first half of the year 1572 was distinguished by a series of triumphs for the patriot party. The nation shook off its fetters in one sudden bound of enthusiasm, and Oudewater, Dort, Leyden, Gorkum, Gouda, Horn, Alkmaar, Edam, and many other towns, ranged themselves under the standard of the prince of Orange. His triumph, however, was short, for the news of the massacre of St. Bartholomew, in August, fell with frightful effect upon his followers, utterly paralyzing their hopes and efforts; his armies melted away, the towns forswore their allegiance to him, and almost in solitude he retired to Holland, the province which best preserved its fidelity. He had but a few days before considered Charles IX. of France as his ally, and was expecting an army of assistance led by Admiral Coligni, when he heard the news of his murder. On many of the offending cities, even those which returned to obedience, Spanish vengeance fell with terrible retribution. At length, at the siege of Alkmaar, after investing the city for seven weeks, the Spaniards were obliged to retreat; and from that moment a brighter day dawned on the Netherlands. Finally, disgusted with the hopelessness of his cause, and furious at the intrigues of those in power about him, Alva obtained his recall, received his successor, Don Luis de Requesens y Zuñiga, Nov. 17, 1573, and on the 18th of the next month left the provinces for ever. His parting advice was, that every city in the Netherlands should be burned to the ground, except a few to be permanently garrisoned; and he boasted that during his six years' rule he had caused 18,000 persons to be executed. But to this immense number must be added those who perished by siege, battle, and merciless slaughter; and the list defies all computation. Every conceivable mode of death and torture was wreaked upon the victims of his royal master's vengeance. At the sack of Haarlem 300 citizens, tied two and two and back to back, were thrown into the lake; and at Zutphen 500 more, in the same manner, were drowned in the river Yssel. Thousands of women were publicly violated, and unborn infants ripped from the wombs of their mothers. Yet Alva was always complaining to Philip II. of the unjust hatred shown toward him, and the "ingratitude" of the Netherlanders in return for his "clemency." He was well received by Philip II., but some time afterward fell into disgrace with the monarch, from espousing the cause of his own son, who had debauched a maid of honor. He was imprisoned and banished until required for the conquest of Portugal. This he accomplished in 1580, and died at the age of 74 years.

ALVAR, Alwur, or **Machery,** a native state of Hindostan, in Rajpootana, between lat. 27° 4′ and 28° 13′ N., and lon. 76° 7′ and 77° 14′ E.; area, 3,573 sq. m.; pop. about 280,000. It is a hilly district, inhabited by a savage, predatory people known as Mewattis, and long famous for their hostility to Europeans. Under British influence, however, their rude character has been greatly modified. The state is governed by a rajah who is under the control of the governor general's agent for the Rajpoot states.—**Alvar,** the capital, is situated at the base of a rocky range, 110 m. S. S. W. of Delhi and 900 m. N. W. of Calcutta. It is a small, ill-built town, surrounded by a wretched mud wall, and overlooked by a fort on the hill. The rajah's palace and some Hindoo temples are the principal buildings.

ALVARADO, a river and town in Mexico, in the state of Vera Cruz. The town is situated on the left bank of the river, about 3 m. from its mouth, and 35 m. S. E. of Vera Cruz; pop. about 2,000. It consists mostly of cane cottages roofed with palm leaves. The country south of the river has numerous plantations of cacao, and produces much rice, both of which articles are sent to the other states of Mexico. There is a dockyard at Alvarado, and a port capable of admitting vessels not exceeding 13 feet draught; and it has considerable commerce with Vera Cruz. The climate is very unhealthy.

ALVARADO, Pedro de, one of the conquerors of Spanish America, born at Badajoz toward the end of the 15th century, died in 1541. In 1518 he sailed with his four brothers for Cuba, whence he accompanied Grijalva in his exploring expedition along the coast of the American continent. Grijalva was so delighted with the aspect of the country that he called it New Spain, and sent Alvarado back to Cuba to report to Governor Velasquez what they had seen and what they had heard, for the first time, about the immense empire of Montezuma. In February, 1519, he accompanied Cortes in his expedition, and took an active and remarkable part in all the incidents of the conquest of Mexico. Cortes, while engaged in the battle against Narvaez, left the city of Mexico under charge of Alvarado, but by his cruelty and rapacity the latter caused an insurrection, and narrowly escaped with his life. In the famous retreat of the night of July 1, 1520 (*la noche triste*), Alvarado distinguished himself by his gallant exploits, and to commemorate his bravery an enormous ditch over which he leaped to escape from the hands of the enemy is called to this day "el salto de Alvarado." On his return to Spain he was received with great honor by Charles V., and appointed governor of Guatemala, which he had conquered in 1523. He married a daughter of the illustrious house of Cueva, from which the dukes of Albuquerque are descended, and returned to America, accompanied by a host of adventurers. Guatemala became highly prosperous under his government. Having authority to extend his conquests, he embarked on the Pacific an expedition of 500 men to effect the capture of Quito, and landed near Cape San Francisco, whence he marched into the interior; but among the Andes he met the forces of Pizarro, prepared to resist his advance. Disclaiming any intention to interfere with his countryman's rights, he received 120,000 pieces of eight as an indemnification for his outlay and losses, and, after a friendly meeting with the conquerors of Peru, returned to Guatemala. Visiting Spain soon afterward, he appeased the emperor's displeasure at this affair, obtained in addition to his former command the governorship of Honduras, and then fitted out from Guatemala a new expedition of discovery, consisting of 12 large ships, two galleys, 800 soldiers, 150 horses, and a large retinue of Indians. Sailing W. and N. W. along the Mexican coast, he was driven by stress of weather into the port of Los Pueblos de Avalos, in Michoacan. Here a messenger from the Spaniards of the interior asked his assistance in putting down a revolt of the Chichimecas of New Galicia. He landed with a part of his force, made a rapid march to the encampment of his countrymen, and with them attacked the Indians, who were strongly posted among the mountains. The Spaniards were defeated and put to flight, and Alvarado was killed by his horse falling upon him at the crossing of a river. The expedition was then abandoned.

ALVAREZ, Francisco, a Portuguese traveller, born in Coimbra, died after 1540. He was chaplain of King Emanuel, and in 1515 accompanied his embassy to the negus or emperor of Abyssinia, then known to the Portuguese as Prester John. Going first to India, they were delayed by various causes, among which was the death of the original ambassador, Duarte Galvam, and the substitution of Don Rodrigo de Lima, a soldier quite unfit for the charge. Landing at Massowah April 6, 1520, their journey through the interior was beset with many difficulties and dangers; but at last, on Oct. 20, they were received at the temporary court of the negus, an encampment in Shoa. Alvarez made himself acceptable to all parties, especially to the Abyssinian priesthood, who respected his religious character, and to the negus, who conceived such an admiration for him that he appointed him ambassador to the Vatican—a mission which Alvarez could only discharge many years afterward, in 1533. The embassy left the Abyssinian court at the beginning of 1521, with a view of returning to Portugal; but a quarrel which broke out among the company, and which called for the interference of the negus, led to their remaining in Abyssinia till 1526, when Alvarez returned to Lisbon, where he was received with great distinction by John III., King Emanuel having died in 1521. The king prompted him to compile an account of his observations during his six years' stay in Abyssinia; and he accordingly prepared an itinerary in five books, which was published in Lisbon in 1540, under the title *Verdadeira Informação do Preste João das Indias*. Only a few copies were printed, and it soon became very rare. A mutilated copy was obtained by Ramusio, in whose collection will be found "The Journey in Ethiopia of Francisco Alvarez."

ALVAREZ, Juan, a Mexican general, leader of the revolution which in 1855 drove Santa Anna from power, born about 1790, died in 1867. He was of Indian blood, and always exercised an extraordinary influence over the people of southern Mexico. Being governor of Guerrero in 1853, he had little difficulty in rousing his mountaineers to insurrection. The outbreak took place at Acapulco, at the beginning of the following year. In the decree promulgated by Alvarez, in March, 1854, which became noted as the plan of Ayutla, Santa Anna's deposition was officially announced, and republican institutions were proposed to the people. After Santa Anna's downfall, Gen. Carrera was intrusted for six months with the charge of the government, which, however, he relinquished in September in favor of Alvarez, whose nomination as president of Mexico was ratified by the assembly of Cuernavaca, which for that purpose he had convoked himself on Oct. 4, 1855. On Nov. 15 he made his entry into Mexico, escorted by a body guard of Indians. His abolition of the privileges of the clergy and the army met with such opposition that he tendered his resignation, substituting in his place his former minister Comonfort, Dec. 11; and after procuring $200,000 from the national exchequer, and what arms and munitions he could get, he returned to southern Mexico.

ALVINCZY, Joseph, baron, an Austrian field marshal, born in Transylvania, Feb. 1, 1735, died in Buda, Sept. 25, 1810. He distinguished himself during the seven years' war at Torgau, at the capture of Schweidnitz, and in the engagement at Töplitz. During the peace he introduced many reforms in the tactics of the Austrian troops. In 1789 he took part, under Field Marshal Loudon, in the campaign against the Turks, and, although he did not succeed in reducing Belgrade, the emperor Joseph II. conferred upon him the dignity of lieutenant field marshal. Subsequently he was sent to Liége to quell an insurrection. He was not successful, but the confidence in his ability as a tactician remained the same, and in 1796, after the defeats of Beaulieu and Wurmser, he was put at the head of the Austrian army against Bonaparte. He obtained some small advantages over the French at the Scalda, at Bassano, and at Vicenza, but he lost the two great battles of Arcole (Nov. 17, 1796) and Rivoli (Jan. 14, 1797), and was recalled, and even accused of treachery. The emperor Francis, who had been one of his military pupils, did not notice these imputations, and appointed him in 1798 superior commander of Hungary, where he reorganized the army, and 10 years later made him field marshal.

ALXINGER, Johann Baptist von, a German poet, born in Vienna, Jan. 24, 1755, died May 1, 1797. Though he was a lawyer, and held the title of court advocate, he availed himself of his legal station only to arrange disputes or plead for the poor. His principal productions are two chivalresque epics in Wieland's style, *Doolin von Mainz* and *Bliomberis*. His works were published in Vienna in 1812 in 10 vols.

ALZEY, a town in the grand duchy of Hesse, province of Rhenish Hesse, situated on the

Selz, 18 m. S. by W. of Mentz; pop. in 1867, 5,358. The chief industries are tanning and the manufacture of tobacco. It was founded in the time of the Romans, and had for some time in the middle ages its own lords, ruins of whose castle are still extant.

AMADEUS, a name very common in the ruling family of Savoy, and first borne by the eldest son of Count Humbert, in the beginning of the 11th century. The most noteworthy rulers of this name are: **I. Amadeus V.,** count of Savoy, the son of Thomas II., born in 1249, succeeded his uncle Philip in 1285, and died at Avignon in 1323. He obtained the surname of Great. He largely increased his dominions by marriage, purchase, and donations. Among his exploits is mentioned a repulse of the Turks from Rhodes, then in the possession of the knights of St. John, a triumph which was believed to have led to the adoption of the "cross of Savoy," and the device F. E. R. T., or F E R T, generally explained by *Fortitudo ejus Rhodum tenuit;* but both the exploit and the explanation are now considered unauthentic. His daughter was married to Andronicus III., emperor of Constantinople. In order to induce Pope John XXII. to preach a crusade in favor of his son-in-law, he undertook a journey to Avignon, where he died. **II. Amadeus VIII.,** count of Savoy, and for some time pope or anti-pope, succeeded his father Amadeus VII. in 1391. He purchased the country of Genevois for 45,000 florins, and thus the house of Savoy became so powerful that the emperor Sigismund in 1416 erected Savoy into a duchy. John Palæologus, duke of Montferrat, agreed to hold the marquisate of Montferrat as a fief of the house of Savoy. By marriage and donation Amadeus made yet further acquisitions. In 1434, however, he abandoned his duchy to his son and retired to the monastery of Ripaille, where he lived so luxuriously that *faire Ripaille* became a saying in the French language, signifying to make good cheer. He had never received holy orders, but was elected pope and crowned at Basel by the cardinal of Arles, under the title of Felix V. The papal dignity was contested by Eugenius IV., who was supported by France, England, Italy, Spain, and Hungary. Eugenius died, and the cardinals at Rome elected Thomas de Sarzana (Nicholas V.). Amadeus resigned the papal crown in his favor in 1449, stipulating, however, that he should be perpetual apostolical legate in his late temporal dominions, that he should continue to wear the pontifical dress except in a few particulars, that he need not go to Rome to attend any general council, and that the pope should rise to receive him, and permit him to kiss his cheek instead of his foot.

AMADEUS I. (Amadeo Ferdinando Maria), king of Spain, duke of Aosta, second son of King Victor Emanuel of Italy, born May 30, 1845. He early held the rank of lieutenant general in the Italian army and that of rear admiral in the navy, and showed much interest in naval affairs. He married, May 30, 1867, the wealthy Italian princess Maria del Pozzo della Cisterna, whose mother was a countess de Merode. His nomination as king of Spain, proposed by Gen. Prim, was sanctioned by Victor Emanuel, subject to the approval of the European powers, which was given in October, 1870, and to the ratification by a majority of the cortes, which took place on Nov. 16. He reached Madrid Jan. 2, 1871, Gen. Prim having been assassinated four days previously. He was himself beset by assassins (July, 1872), by Carlist risings, and by other dangers and administrative difficulties. Becoming discouraged, he abdicated the throne for himself and his heirs, Feb. 11, 1873, and returned to Italy, the cortes immediately proclaiming and organizing a republic.

AMADIS OF GAUL, the mythical hero of one of the early romances of chivalry, written by Vasco de Lobeira, a gentleman of the Portuguese court, who died in 1403. The Portuguese original is lost, and the earliest known version is the Spanish one of Montalvo, made between 1492 and 1504. It has been translated into various languages, and extended to five times its original length, and was the most popular as it is the best of all the fictions of its class. Amadis, the pattern of a perfect knight, is supposed to have flourished soon after the beginning of the Christian era, and to have gone through a variety of adventures in England, France, Germany, Turkey, and more or less imaginary countries. He is the son of an imaginary king of Gaul (perhaps Wales), and crowns his adventures by marrying Oriana, daughter of Lisuarte, king of England.

AMADOR, an E. county of California, bordering on the Sierra Nevada, bounded S. E. by the Amador river, a tributary of the Sacramento, and drained by the branches of the San Joaquin; pop. in 1870, 9,582, of whom 1,627 were Chinese. Gold, copper, marble, and quartz abound. The productions in 1870 were 16,678 bushels of wheat, 51,815 of barley, 36,760 of corn, 78,010 lbs. of wool, and 54,165 gallons of wine. There were 36 quartz mills for the production of gold, 9 saw mills, and 2 newspapers. Capital, Jackson.

AMALARIC, the son of Alaric II., and last Visigothic king of Spain, born in 501, died in 531. He was not yet six years old at his father's death, and his bastard brother would have supplanted him had not his grandfather Theodoric, king of the Ostrogoths, seized the throne and preserved it for his grandson until he reached manhood. He married Clotilda, daughter of Clovis, king of the Franks, in 527, and having treated her with great cruelty to induce her to embrace Arianism, her brother Childebert marched against him, and defeated him in battle. He was killed in the flight.

AMALASONTHA, or **Amalasuintha,** daughter of Theodoric the Great, king of the Ostrogoths, born in 498, died in 535. Her husband Eutharic having died, her intellect and learning decided Theodoric to make her regent of Italy during the minority of her son Athalaric, to whom he bequeathed that kingdom. Assuming power in 526, and availing herself of the aid of Cassiodorus, she showed great administrative talent; but her efforts to educate her son were thwarted by the Gothic nobles and by his own intractable disposition, and his debaucheries destroyed him in his youth. She still endeavored to retain power, but through the influence of Justinian was imprisoned and strangled by her cousin Theodatus, whom she had married and made co-regent.

AMALEKITES, a Bedouin tribe, who, according to Arabian traditions, lived in very early times near the Persian gulf, but were gradually driven westward by the Assyrians. When they were first known by the Israelites, they inhabited the peninsula of Sinai and its neighborhood to the north, thus controlling the routes across the isthmus of Suez. They are mentioned as defeated by the four kings, and again as harassing the march of the Israelites out of Egypt. They were afterward defeated at Rephidim, but in turn vanquished the Israelites near Hormah, where they had the Canaanites as allies. They are mentioned several times after this, but no longer as powerful; and they seem to have been almost exterminated by Saul and David.

AMALFI, a city and seaport of S. Italy, in Principato Citra, on the gulf of Salerno, 24 m. S. E. of Naples; pop. about 5,000, and with several independent villages about 7,000. It is encircled by mountains and precipices, at the mouth of a gorge, from which a little torrent dashes into the gulf, furnishing power for numerous mills and manufactories. It has been an archbishop's see since 987, and besides the ancient cathedral, in the Romanesque style, there are several fine churches and a Capuchin convent. The coasting trade, fisheries, and manufactures of paper, soap, and macaroni are the principal industries. The macaroni of Amalfi is famous, and is exported to all parts of the world.—Amalfi is believed to have been founded in the 4th century, but is not mentioned in history till the 6th. It early became an independent republic, governed by doges, and the principal centre of eastern trade, with a population of 50,000, the dependent territory comprising 500,000. It originated a new maritime code (*Tabula Amalphitana*), introduced into Europe an improved knowledge of the mariner's compass, and preserved the earliest known MS. of the Pandects. The inhabitants also acquired distinction in the crusades as the founders of the hospital of St. John of Jerusalem, from which the knights of Malta derived their name. In 1075 Robert Guiscard was called to the aid of the republic against the duke of Salerno, and afterward annexed it to his dukedom of Apulia; but it maintained a partial independence till 1131, when it capitulated to King Roger of Sicily, retaining the right of municipal self-government. Its decline in commercial importance was hastened by wars with the Pisans, by the encroachments of the sea upon its harbor from the 12th century, and the destruction of its quays and public works by a great storm in 1343. In later times the titles of duke and prince of Amalfi were held by various families,

Amalfi.

AMALGAM (Gr. *ἅμα*, together, and *γαμεῖν*, to marry; or according to some, *μάλαγμα*, an emollient, from *μαλάσσειν*, to soften), an alloy of two or more metals, one of which must be mercury. This metal has a remarkable power of dissolving most of the other metals and forming combinations that may be applied directly to various uses; and, moreover, as the mercury is easily expelled from them by heat, these combinations are used as a means of bringing other metals into a condition of convenient application to many purposes. Thus, gilding is sometimes effected by washing other metals with a solution of gold in mercury. The mercury is driven off by heat, and the gold remains coating the surface. A process is patented in England for covering iron with zinc, which is based on this principle. A considerable degree of cold is produced in forming some amalgams. Thus, in mixing at a temperature of 65° F. 118 parts of tin and 201 of lead, both in filings, 284 of bismuth in fine powder, and 1,616 of mercury, the temperature falls to 18°. Many of the amalgams are definite compounds, from which the mercury in excess may be squeezed out; but sometimes the liquid that thus escapes is found to be itself an amalgam, containing a smaller proportion of the harder metals, seeming to indicate two definite compounds of different proportions. This is observed with the amalgam of mercury with silver, and also with tin. In tinning mirrors, the glass plates are laid upon smooth stone tables covered with the amalgam. The solid portions adhere in a thin film to the glass; and this is a compound of atomic proportions. The liquid squeezed out by the weight placed upon the glass proves also to be an amalgam containing but a small proportion of tin.—Amalgams are prepared by putting the harder metals, reduced to small size, in mercury, and dissolving them with or without heat, as may be required. When the metals are not easily dissolved, they may be rubbed together or triturated in a mortar, or melted, and the mercury heated and poured into the fused metal. This is the process for preparing an amalgam of 4 parts mercury, 2 zinc, and 1 part tin, for the electrical machine. The zinc is first melted, the tin added, and then the hot mercury stirred in. It is to be shaken till cold, then triturated and sifted in a fine sieve. An amalgam of mercury with iron is prepared by rubbing together in a mortar clean iron filings and zinc amalgam, and adding a solution of perchloride of iron. By rubbing and heating this mixture a bright amalgam of iron and mercury is produced. Some amalgams take a crystalline form, thus indicating combination in definite proportions; and there is also a native amalgam of this character of mercury with silver. This is found in dodecahedral crystals, consisting of 1 atom of silver and 2 of mercury=36 per cent. of the one and 64 of the other. One part of gold heated with 6 parts of mercury crystallizes on cooling in four-sided prisms. Tin amalgam made of 3 parts of mercury and 1 of tin forms cubic crystals. Amalgams freed from their excess of mercury are, when freshly made, dry pasty substances, which soon become hard like stone. This property makes some of them convenient for filling cavities of teeth, but the injury the mercury may effect upon the system renders their use highly objectionable.

AMALGAMATION, the process of extracting gold and silver from the gangues in which they occur in nature by combining them with mercury. The ores are crushed and then washed through different machines in which mercury is placed. This seizes upon the little particles of the metals that come in contact with it, and brings them together into one mass, from which the earthy matters are all washed away. Any greasy substance present almost wholly prevents this effect, the grease adhering in a film upon the surface of the mercury, and thus rendering impracticable the close contact necessary for their union. The amalgam is from time to time taken out of the washing machines, squeezed through cloth or dressed deerskin, the liquid portion replaced, and the solid distilled in an apparatus suitable for saving the mercury, which is then ready for use upon another lot of ore. The silver residue from distillation needs refining to render it perfectly pure. There are two processes for separating silver from its ores by amalgamation—the European process in barrels, and the American in heaps. The ore is treated in the European process by pulverizing the ore and roasting it with an admixture of common salt; by this means all the silver, which was originally a sulphide, is converted into the chloride. The roasted ore is then placed in barrels which can be revolved upon a vertical axis, and is thoroughly loosened and stirred up with water. Iron in the form of nails or scrap is then added, which takes the chlorine from the silver and yields the latter in the metallic state. Mercury is then added in larger quantity than is sufficient to amalgamate all the silver. After the barrel has revolved for an hour or more the mercury will have taken up the silver, and is then drawn off. This mercury is filtered and distilled as above described. The American process of amalgamation in heaps has the advantage of simplicity, and although not so perfect in its extraction of silver, it does not require fuel and expensive apparatus. The ore is first broken up to the size of a pea by means of rude stamps, and then ground to fine powder in round cylindrical tubs with bottoms of stone. Each tub has a horizontal arm revolving with its centre upon the vertical axis of the tub, and having at each end a chain attached to a stone weighing from 50 to 100 pounds. When the arm is revolved, these stones are dragged round and pulverize the ore. The ore is then placed on an amalgamating floor built of stone, and is mixed with a little salt and mercury. After some days the mercury is collected, filtered, and distilled as above described, to save the silver.

AMALIA, Anna, duchess of Saxe-Weimar, second daughter of Duke Charles of Brunswick-Wolfenbüttel, born Oct. 24, 1739, died April 10, 1807. She was married to Duke Ernest of Weimar in 1756. After her husband's death in 1758 she took the reins of government, and held them so well that Saxe-Weimar was able speedily to recover from the effects of the seven years' war, and escaped the famine of 1773. In 1775 she resigned the administration to her son, and devoted herself to the cultivation of literature. For 30 years she lived in the society of Wieland, Goethe, Herder, Schiller, and other men of eminence.

AMALIE, Marie Friederike, queen of Greece, born Dec. 21, 1818. She is a daughter of the late grand duke Paul, and half sister of the reigning grand duke Nicholas of Oldenburg, and was married to King Otho of Greece Nov. 22, 1836. She imparted a high tone to the court circles of Athens, and was much respected in Greece on account of her firmness, her benevolence, and her varied accomplishments. In 1856 she acted as regent during the foreign occupation of Athens. A Greek student made an attempt to shoot her in 1861. On Oct. 24, 1862, after the deposition of her husband, she went with him to Bavaria, and since his death (July 26, 1867) has resided at Bamberg. Her sister married in 1855 Maximilian de Washington, a Bavarian baron, a descendant of the English Washington family, resident in Styria.

AMALIE, Marie Friederike Auguste, duchess, a German dramatist, eldest sister of King John of Saxony, born in Dresden, Aug. 10, 1794, died in the palace of Pillnitz, Sept. 18, 1870. She wrote two dramas under the name of Amalie Herter (Dresden, 1829–'30). Among her subsequent productions, which are noted for a love of humanity and virtue, her comedies *Der Onkel* and *Die Fürstenbraut* became very popular. The latter was performed in Paris under the title *Une femme charmante* (1840). Others of her plays were also adapted to the French stage. A complete edition of her dramatic works was published in Dresden, for the benefit of the women's association, under the title of *Originalbeiträge zur deutschen Schaubühne* (6 vols., 1837–'42). A 3d edition of the 1st volume appeared in 1858, and a French version of it (*Comédies*) at Paris in 1841. Six of her dramas were translated into English by Jameson (London, 1846), and six others anonymously (1848). She composed operas and sacred music.

AMALS, or **Amali,** the name of the royal family of the Goths. Of this family were all the sovereigns of this nation until the division into Ostrogoths and Visigoths. After that event the Ostrogothic kings were Amals until the extinction of the male line in Theodoric the Great. According to the legendary chronology recorded by Jornandes, the Gothic bishop and chronicler Amal, or Amala, who gave the name to the family, was the fourth descendant of Gapt, the first Gothic king. Amal is supposed to have signified spotless.

AMALTHÆA, in Greek mythology, the nurse of the infant Zeus. She is commonly supposed to have been a goat, who, with her two young ones, was translated to the skies, where all three were metamorphosed into stars by the father of the gods. Zeus, according to one of the various myths on the subject, broke off one of the horns of the goat Amalthæa, and presented it to the daughters of Melisseus, king of Crete. This horn was endowed with such miraculous power that whenever the possessor wished, it would instantly become filled with whatever might be desired.

AMANUS, the ancient name of a mountain range, a branch of Mount Taurus, extending in a N. E. direction from the gulf of Issus toward the Euphrates, and separating Cilicia from Syria, which it bounds on the north.

AMAR, J. P. André, a French revolutionist, born in Grenoble about 1750, died in Paris in 1816. Elected in 1792 to the convention for the department of Isère, he voted for the execution of Louis XVI. within 24 hours, and for the rejection of the appeal to the people. Being sent as a commissary to his own department, he showed himself a merciless persecutor of his neighbors, systematically denounced the Girondists on every occasion, and contributed his part to the fall of the Dantonists, then called *modérés*, and the Hebertists, stigmatized as anarchists. He appeared to favor Robespierre's system, but materially contributed to his defeat before the convention. When in 1795 Collot d'Herbois, Billaud-Varennes, and Barrère were condemned to be transported, he presented himself as their advocate. The consequence of this act was his confinement in the fortress of Ham. He regained his liberty by the decree of amnesty rendered by the convention on its final adjournment. By order of the directory, he was subsequently arrested as an accomplice in the conspiracy of Drouet and Babœuf, but released for want of legal testimony. However, he was exiled from Paris during Napoleon's reign, and spent the rest of his life in obscurity.

AMARANTH (*amarantus;* Gr. ἀμαράντος, unfading, because the flowers retain their bright colors when dead), a genus of plants of the family of *amarantaceæ.* This genus is rich in species, most of which grow within the tropics (about 60 in Asia, 105 in America, 10 in Africa), some without the tropics (about 20 in Asia, 25 in America, 28 in New Holland, several in Africa, 5 in Europe), either in groups or singly, in dry stony situations or among thickets, few in salt marshes. The most ornamental exotic species, cultivated in Europe and in the United States, all annuals, are: *A. caudatus* (love-lies-bleeding), native of India, from 2 to 3 feet high; leaves oval, oblong, reddish; flowers crimson, in long hanging clusters; a gigantic variety is 9 feet high. *A. sanguineus*, of India; stem and leaves blood-red; leaves oval, often emarginate; flowers red, small, axillary, with internodal clusters. *A. speciosus*, of Nepaul; pyramidal, 6 feet high; flowers purplish crimson along the branches. *A. tricolor*, of China;

Amarantus caudatus (Love-Lies-Bleeding).

branchy, 3 feet high; leaves yellow, red, and green; flowers green, lateral. *A. hypochondriacus* (prince's feather), with erect flower spikes and purplish foliage, is a native of Virginia. These hardy species can be sown in the open border, while the less hardy require a gentle hot-bed, whence they may be potted off singly, in rich soil, and well watered. The above-named species blossom from June to October. Many of the species, having mucilaginous leaves, are used as pot herbs, with lemon juice. *A. viridis* is emollient, good for cataplasms. The seeds of *A. frumentaceus* and *anardhana* are eaten in India. *A. obtusifolius* is diuretic. Some others are variously employed in South America.

AMARAPURA, or **Ummerapura,** a city of the Burman empire, 6 m. N. E. of Ava, near the left bank of the Irrawaddy. It was founded in 1783, and made the capital of the country, but in 1819 the seat of government was transferred again to Ava. In March, 1810, the whole city, then containing over 170,000 inhabitants, was burned to the ground. In 1827 the population was not over 30,000. Many of the public buildings present a magnificent spectacle, having their roofs richly gilt within and without. One of its temples, a vast edifice adorned with sculptures, contains a colossal bronze statue of Gautama. A whole street was formerly occupied by goldsmiths. Dr. Adolf Bastian, who visited Amarapura in 1861-'2, describes it as entirely decayed, only a suburb inhabited by Chinese exhibiting any activity.

AMASIA, Amasieh, or **Amasiyah,** a city of Asia Minor, in the pashalic of Sivas, on the Yeshil-Irmak, 50 m. S. S. W. of Samsun on the Black sea; pop. about 25,000. It is situated in a deep valley enclosed by precipitous rocks, upon one of which, on the left bank of the river, are the remains of an ancient acropolis and two Hellenic towers. Four bridges, one probably of Roman construction, cross the river within the limits of the city. The houses are of stone, but mean and small; the bazaars are poor; and the principal buildings are in ruins. There is an active trade in raw silks, wine, madder, grain, and cotton. The early history of the town is unknown. It was the metropolis of Pontus under the Roman domination of Asia Minor. Strabo the geographer was born here, and gives a minute description of the place. The tombs of the kings, of which he speaks, are still to be seen, scooped out of the face of the rock upon which the citadel stands.

AMASIS, or **Amosis** (Eg. *Ahames* or *Ahmes*, the new moon, or engendered by the moon), the name of two Egyptian kings. **I.** The first Pharaoh of the 18th dynasty. He reigned from 1525 to 1499 B. C. He led the insurrection against the Hyksos in Lower Egypt, besieged and captured their great stronghold, Avaris, pursued them into Canaan, captured there a number of towns, and thus began that series of Egyptian wars in western Asia, in which his successors carried their arms even beyond the Euphrates. **II.** The last ruler but one of the 26th dynasty, reigned from 569 to 526 B. C. He erected monuments in various parts of Egypt, and particularly adorned Saïs. He was a good sovereign, and is mentioned especially by Herodotus as having had friendly intercourse with Solon, and with the celebrated Polycrates of Samos. He encouraged Greeks to settle in Egypt, and maintained good relations with Cyrene and other Hellenic states. Under his son Psammenitus, who reigned only six months, Egypt was conquered by Cambyses.

AMATI, a family of Cremona, celebrated for the perfection attained by many of its members in the construction of violins and instruments of that class. **I. Andrea,** born in Cremona between 1500 and 1520, died about 1577. He is said to have served an apprenticeship as a violin maker at Brescia, and he established a shop of his own at Cremona while still a young man. The instruments used in the chamber concerts of his time, such for instance as the lutes, theorbos, guitars, and mandolins, were all soft-toned, and sweetness rather than power of tone was sought in their construction. Following this taste, his violins are remarkable for their exquisite softness of tone and the beauty of their workmanship. They are of small and medium patterns, the arch elevated; the wood of the bottom runs with the grain, the sounding-boards are moderately thick, and the varnish is of a clear brown. Very few of his instruments now exist. Charles IX. possessed a collection of 24 violins, viols, and basses made to his order by Andrea Amati. They were very elaborately ornamented, having the arms of France and various other devices painted in colors on the back. **II. Nicolò,** a younger brother of the preceding, known for the excellence of his violoncellos. He is believed to have outlived Andrea, though the exact dates of his birth and death are uncertain. **III. Antonio,** son of Andrea, born at Cremona about 1550, died in 1635. He was his father's pupil, and succeeded him in business. For a time he was associated with his brother Geronimo, and the instruments bearing their joint names are much esteemed. Antonio adopted the models of his father, but made a much greater number of small than of large instruments. His violins produce delicate, sweet, and pure tones, but they have little power. The first and second strings are the best, the third a little dull, and the fourth slightly dry in tone. His violins are all of exquisite finish; the arch is high in the centre, and the fir of which the sounding-boards are made is of a fine and delicate grain. **IV. Geronimo** (date of birth and death unknown), youngest son of Andrea, was a pupil of his father. His violins were generally of a larger pattern than those of his father and brother, and inferior to them. No violins bearing his mark subsequent to 1638 are known to exist. **V. Nicolò,** son of Geronimo, born Sept. 3, 1596, died Aug. 12, 1684. He was the most celebrated of the family, and the greater part of the instruments known as Amatis are from his hands. He not only made great changes in the models and proportions adopted by his family, but gave to his details a higher finish and to his curves a greater perfection, while he discovered a mellower and more beautiful varnish. The relation of the swells and the thicknesses of his instruments is better planned than in those of his father or his uncle. Thence it is that, while preserving their distinguishing sweetness of tone, they attain more power and brilliancy. Some violins at which this maker would seem to have worked with unusual care are masterpieces of art. One of two dated 1688 was at Milan in the collection of Count Cozio de Salabue. In perfection of finish, purity and mellowness of tone, this instrument was considered a marvel. The great violinist Alard also possessed one of the finest instruments that ever came from the hand of this great maker. The weakest point in his violins is the second string, which, owing, it is believed, to the too sudden decrease in the thickness of the belly toward the sides, is thin, the notes Si and Do being particularly liable to this objection. As is the case with the instruments of all the other makers of this family, the tones of those made by Nicolò are slender, but in an especial degree sweet, round, and silvery.

AMATITLAN, a town of Guatemala, Central America, about 18 m. S. of the city of Guatemala, in lat. 14° 30′ N., lon. 90° 17′ W.; pop. about 15,000. It lies in a volcanic region, near and somewhat below a mountain lake of the same name. It is a principal seat of the cochineal cultivation. The houses are of one story and of mud, roughly moulded. Hot springs abound in the neighborhood. The waters of the lake have a high temperature, and are supposed to possess medicinal qualities.

AMATUS LUSITANUS (that is, the Portuguese), whose proper name was JOAO RODRIGUEZ DE CASTEL BRANCO, a Jewish physician, born in Portugal in 1511, after the expulsion of all unconverted Jews from the country, died in 1568. He was ostensibly brought up as a Christian, studied at Salamanca, travelled in France, the Netherlands, and Italy, and dissected 12 human corpses in Ferrara, which was a great feat for a time when religious and popular prejudices ran so strong against the practical prosecution of anatomical science. Having settled in Ancona, he was persecuted as a Jew, and obliged to leave the town after the accession of Paul IV. in 1555. He fled from city to city to save himself from the inquisition. At last he obtained safe refuge at Salonica in Macedonia, where he passed the remainder of his days.

AMAUROSIS (Gr., from ἀμαυρός, dark), partial or complete loss of sight, dependent on a change in the nerve structure of the eye. The term was formerly used to denote any loss of sight the cause of which could not be appreciated by the naked eye; but the invention of the ophthalmoscope has been the means of restricting it to those cases in which the optic nerve or its expansion, the retina, has undergone atrophy, or its component parts are so pressed upon that they are no longer capable of performing their functions. The tissue which holds together the fibres of the optic nerve being in close connection with that covering the bone in its vicinity, and with the membranes of the brain, an inflammation of these latter may by extension induce the disease. A hæmorrhage (apoplexy), or a tumor near or in the nerve, may by pressure cause this condition; or even a plugging of the artery which should supply the nerve with blood; or, finally, certain diseases of the brain or spinal cord, or of the nerve itself. The disease is usually progressive. If the cause be mechanical from pressure, of recent origin, and removable by treatment before change in the nerve structure has proceeded too far, the vision may be restored or its further loss prevented. Such cases are exceptional.

AMAURY, or **Amalric,** the name of two kings of Jerusalem. **I.** Count of Joppa, born in 1135, died July 11, 1173. He was crowned king of Jerusalem in 1162, on the death of his brother Baldwin III. He was a vain, ambitious, and imprudent prince, and passed the eight years of his reign in making war on the natural ally of the Franks, the sultan of Egypt, and his only sure support against the inroads of the Seljuk Turks. Having invaded Egypt with some success, he was soon forced to the defensive by Saladin, who continued his conquests under Baldwin IV., the son and successor of Amaury. **II.** Of Lusignan, king of Cyprus, was called to the tottering throne of Jerusalem when near its downfall. His nominal reign there lasted from 1194 to 1205. He called upon the western nations to aid him against the Saracens, but the crusaders preferred stopping at Constantinople, and partitioning the Byzantine empire, to the more dangerous service against the Moslems. He left Cyprus to his son Hugo de Lusignan.

AMAURY OF CHARTRES. See ALMARIC OF BÈNE.

AMAXICHI, or **Amakuki,** a seaport town of Greece, capital of the nomarchy of Leucas, at the N. E. extremity of Santa Maura, Ionian Islands, separated by a narrow channel from Acarnania; lat. 38° 50′ 15″ N., lon. 20° 43′ E.; pop. about 5,500. From the liability to earthquakes, the houses are chiefly of wood and of one story. It is rendered unhealthy in summer by numerous salt marshes. The harbor has an extensive mole, but is only available for small craft. The town is defended on the N. by the strong castle of Santa Maura. It is the see of a Greek archbishop.

AMAZIAH, king of Judah 838–809 B. C. See HEBREWS

AMAZON, or **Amazons** (Port. *Rio das Amazonas*), the largest river on the globe, flowing easterly from the Andes to the Atlantic, and draining about a third of South America, or an area variously estimated from 1,500,000 to 2,500,000 sq. m. The Apurimac, an affluent of the Ucayali, is by some considered as its source; but it properly rises in Lake Lauricocha near the mines of Cerro Pasco. The head waters, under the name of Tunguragua or Upper Marañon, flow northerly 500 m. in a series of rapids between the Peruvian Cordilleras, and on reaching the boundary of Ecuador run E. N. E., maintaining this course to their exit under the equator. But the Amazon is a vast river system, rather than one river. More than 350 branches and lesser tributaries unite in the grand trunk of this giant stream. From lat. 3° N. to 19° S., a distance, measured by the windings of the mountain chain, of 2,000 m., there is not a stream that descends the eastern slope of the Andes that does not contribute its waters to swell this mighty flood. Besides the Tunguragua, we find on the S. side the Huallaga, rising within a few miles of its source, and having nearly the same course and length; it is navigable by steamers to Yurimaguas and by canoes to Tingo Maria. About 200 m. below its mouth enters the magnificent Ucayali. This tributary rises near Cuzco, and has a length of about 1,200 m., with an average width for 250 m. above its mouth of half a mile, and a current of 3 m. an hour. A small steamer has ascended 773 m. from Nauta. Several large but little known streams succeed, as the Javari, Jutahi, Teffé, and Purús, the last of which has been ascended 1,800 m. But the largest contributor to the Amazon is the Madeira. At its junction it is 2 m. wide and 66 feet deep. Its extreme length is probably 2,000 m., and it is navigable 480 m. Of its affluents, the Beni rises near Lake Titicaca, and the Mamoré is separated only 15 m. from the source of the Pilcomayo, the largest affluent of the Paraguay. The Tapajos, 1,000 m. long, rises within 20 m. of the head waters of the Paraguay, and is navigable 160 m. above Santarem. East of the Tapajos are the Xingú and Tocantins, navigable about 150 m., the latter of which, however, is an affluent of the Pará, and not of the Amazon proper. From the north, the great river receives the Negro, 1,200 m. long. This tributary is of commercial importance, not only because of the rich region through which it flows, but also because it is connected with the Orinoco by the natural canal Cassiquiare. Nearly parallel to the Negro are the Japurá and Putumayo, each 1,000 m. long; and further W. flow the Napo and Pastaça, rising in the Quitonian Andes, the former navigable 500 m., the other a torrent. The total length of the Amazon from its source to Pará, following the curves, is 2,750 m. If we consider the Ucayali as the head, it will measure 3,000. Lieut. Herndon estimated its length from the source of the Huallaga at 3,944 m. Though not the longest, the Amazon is the most voluminous river on the globe. The water passing Obidos every second amounts to 500,000 cubic feet, and its freshening influence is perceptible 500 m. from the coast. Some idea of its magnitude may be gained from the fact that 900 m. from its mouth it receives a tributary 2,000 m. long. The usual current is 3 m. an hour. The depth varies from 42 feet in the upper part to 312 at its mouth; at Tabatinga, where it crosses the Brazilian frontier, it is 66 feet. It is deep at the very edge, not having those sloping shores which characterize most streams. At Nauta, 2,300 m. from the sea, it is ¾ m. wide; at the entrance of the Madeira it is 3 m.; below Santarem it is 10 m.; and if we include the Pará, its mouth is 180 m. wide. The Pará river, however, is distinct, and is joined to the Amazon by very narrow channels.—Like other tropical rivers, the Amazon is subject to periodical inundations. The banks, usually high, are overflowed, and vast tracts are flooded. The rise above the lowest level is between 7 and 8 fathoms. At Ega the rise begins about the close of February. The tide of the ocean is perceptible at Obidos, 450 m. up. The bore, or *pororoca*, as it is termed by the natives, is a phenomenon worthy of remark. It was well described by La Condamine, more than 100 years ago, in these terms: "During three days before the new and full moons, the period of the highest tides, the sea, instead of occupying six hours to reach its flood, swells to its highest limit in one or two minutes. The noise of this terrible flood is heard five or six miles, and increases as it approaches. Presently you see a liquid promontory, 12 or 15 feet high, followed by another, and another, and sometimes by a fourth. These watery mountains spread across the whole channel, and advance with a prodigious rapidity, rending and crushing everything in their way. Immense trees are instantly uprooted by it, and sometimes whole tracts of land are swept away." It is difficult for vessels to withstand such a tide, and hence those accustomed to the navigation of the river avail themselves of *esperas*, or resting places, where their vessels may be sheltered from its violence. Another characteristic feature is the system of back channels joining the tributaries, and the *igarapés* or canoe paths through the forest. One may go from Santarem 1,000 m. up the Amazon without ever entering it. The water of the upper Amazon and of the Pastaça, Huallaga, Tapajos, Xingú, and Tocantins is blue or olive-green; that of the lower Amazon and of the Madeira, Purús, Jutahi, Javari, Ucayali, Napo, Putumayo, and Japurá is yellowish; of the Negro and Teffé, black. The temperature of the water will average about 80°. The river is full of islands and sand bars, and the axis of the channel is constantly changing. A vast amount of sediment is carried into the sea, but there is no delta proper, the Marajó and other islands in the great estuary having a rocky base.—The immense valley of the Amazon is walled in by the Andes and the highlands of Guiana and Matto Grosso. No other region of equal area has such a remarkably uniform character, and its geological formation is of deep interest. Scarcely anything is visible but variegated clays and a reddish sandstone. Prof. Agassiz has considered it a cretaceous basin filled with glacial drift; but Prof. Orton in 1867 discovered a highly fossiliferous deposit in the clay formation, containing extinct shells, showing it to be of pliocene or miocene date. The region traversed by the Amazon and its affluents is covered with vast forests, and possesses a soil of extraordinary fertility. "If," says Humboldt, "the name of primeval forest can be given to any forest on the face of the earth, none perhaps can so strictly claim it as those that fill the connected basin of the Orinoco and the Amazon." "From the grassy steppes of Venezuela to the treeless pampas of Buenos Ayres," says a later traveller just referred to, "expands a sea of verdure, in which we may draw a circle of 1,100 m. in diameter which shall include an evergreen, unbroken forest. There is a most bewildering diversity of grand and beautiful trees—a wild, unconquered race of vegetable giants, draped, festooned, corded, matted, and ribboned with climbing and creeping plants, woody and succulent, in endless variety. The exuberance of nature displayed in these million square acres of tangled, impenetrable forest offers a bar to civilization nearly as great as its sterility in the African deserts." Palms, leguminous trees, and giant grasses are the predominant forms. The most valuable for commerce are the caoutchouc tree and Brazil-nut tree, and more than 100 varieties of beautiful woods eminent for their hardness, tints, and texture. —Animal life is not so conspicuous in the forest as in the river. The latter is crowded with strange fishes (of which the largest is the *pirarucú*, 8 ft. long), alligators, turtles, anacondas, porpoises, and manatees. Mammals, birds, and reptiles are scattered through the forest in great variety, but few appear in any one place. The common forms are monkeys, jaguars, tapirs, capybaras, peccaries, sloths, deer, armadillos, toucans, and macaws. The shores are likewise thinly inhabited; the most important tribes are the Mundurucus, Tucunas, and Yaguas. The largest towns are Pará, Santarem, Manáos, and Iquitos.—The Amazon presents an unparalleled extent of water communication. It starts within 70 m. of the Pacific, and with its tributaries touches Guiana and Paraguay. The Amazon was opened to the world in 1867, and regular lines of steamers ascend to Yurimaguas on the Huallaga. The most important exports are rubber, cacao, nuts, copaiba, cotton, hides, piaçaba (palm fibre), sarsaparilla, farina, tonka beans, annotto, and tobacco. The Amazon navigation company (Brazilian), established in 1854, had in 1872 a capital of $2,200,000, and 9 steamers, 5 of which ply exclusively in the Amazon waters: 2 between Pará and Loreto in Peru, distance 2,100 m.; 1 on the Peruvian branch of the river, 288 m.; 1 from Pará to Obidos, 400 m.; 1 from Santarem to Faro; total distance, round trips, 10,491 m. Total receipts in 1869 for passengers and freight, $207,452 08. Imports, $402,580 40; exports, $364,614 19. —Yañez Pinzon discovered the mouth of the Amazon in 1500; but the river was first navigated by Orellana, Pizarro's officer, who in 1541 descended from the Napo to the Atlantic. In 1637 Texeira ascended by the Napo to Quito, and Father Acuña, who accompanied him, published the first description. The name Amazon is derived either from the Indian word *amassona*, boat-destroyer, or from Orellana's story of his fight with a nation of female warriors; which fable probably grew out of the fact that the men part the hair in the middle and wear long tunics. The old names of the river, Orellana and Paraná-tinga, are obsolete. Alto Amazonas, or Upper Amazon, is applied to all above the Negro. To the middle Amazon, between Tabatinga and Manáos, the name Solimoens is sometimes given. The part above Tabatinga, or the Peruvian portion, is called Marañon, which includes the Tunguragua.

AMAZONAS. I. The northernmost province of Brazil, bounded N. by Guiana and Venezuela, N. W. by Colombia, W. by Ecuador and Peru, S. by Peru, Bolivia, and the Brazilian province of Matto Grosso, and E. by the province of Pará. Its limits have not been precisely defined; pop. about 80,000. The surface is covered by virgin forests, and but little known. In this province, at and near the town of Manáos, the river system of South America unites. The principal streams are the Amazon (which above Manáos is called the Solimoens), Negro, Putumayo, and Madeira. **II.** A N. department of Peru, bounded N. by Ecuador; area, about 18,000 sq. m.; pop. 44,000, besides about 60,000 Indians of nomadic tribes. It is traversed by the Andes. The soil, which is watered by the Marañon and several of its affluents, is extremely fertile, and produces wheat, corn, rice, all sorts of fruits and vegetables, sugar cane, tobacco, cacao, coffee, cotton, indigo, quinine, and sarsaparilla in abundance. Its virgin forests are rich in mahogany, cedar, and other valuable timber. The chief industries are the manufacture of sugar, rum, cottons, and woollens, and the salting of fish. Capital, Chachapoyas.

AMAZONIA, a title given by the geographers of the 17th and 18th centuries to an unexplored tract in the central portion of the Amazon basin, supposed to be inhabited by a tribe of warlike women, who governed themselves, and would tolerate no males in their community.

AMAZONS (Gr. *α* privative and μαζός, breast), a race of warlike women, whose original seat is said to have been in the country adjoining the Caucasus. They were believed to be governed by a queen, and to propagate the species by cohabiting once every year with the Gargareans, a nation of men whose territory was separated from that of the Amazons by a chain of mountains. Their male children were either sent to the Gargareans or put to death. Their female children were deprived of the right breast, and trained by their Amazon mothers to war, hunting, riding, and agriculture. The favorite deities of the Amazons were Mars and the Taurian Diana. The Amazons were fabled to have made extensive conquests in the early ages, in Asia, Africa, and Europe, and to have founded several cities in Asia Minor and the islands adjoining it, such as Ephesus, Smyrna, Cyme, and Paphos. It is a question with ancient writers whether these extraordinary women ever existed.

AMBASSADOR, or Embassador, a term generally applied to the highest class of diplomatic representatives in foreign countries. In an official sense it designates only those who are accredited by one potentate to another, and who represent the sovereign himself, while ministers plenipotentiary and envoys extraordinary, although accredited to the crown, represent only the state, and not the person of its chief. The queen of England, for instance, sends ambassadors to the most influential sovereigns, but only a minister plenipotentiary to the United States. The American minister plenipotentiary and envoy extraordinary (the title ambassador being not often used, although it is mentioned in the act of congress of 1856 relating to the diplomatic service) is consequently outranked at European courts by the ambassadors of the pettiest sovereign princes. The legates and nuncios of the pope are entitled to the same social and diplomatic privileges as ambassadors. An ambassador may at all times demand a personal interview with the sovereign as a matter of right, while the minister plenipotentiary can only claim an audience as a favor. Ambassadors extraordinary are those sent on special missions, and occupy a still more exalted position than those called ordinary, who permanently reside at a court. Ambassadors in the principal non-Christian countries enjoy extra-territorial rights, based upon the fiction that they carry along with them the whole territory of their sovereign, so that the country represented is deemed to be present in China, Japan, Turkey, &c., as well as its sovereign himself, in the person of the ambassador. The extra-territorial rights of ambassadors and other official representatives of Christian powers in the East are guaranteed by treaties, and are predicated upon their jurisdiction over more or less extensive communities of their countrymen and over other persons under their protection.

AMBER, a hard, light, nearly transparent resinous substance, found in loose pieces in alluvial deposits, or scattered along the coast after severe storms. It was regarded by the ancient Greeks and Romans with superstition, and in mythology was spoken of as the tear drops shed by the sisters of Phaëthon, and petrified as they fell into the sea. The electrical phenomena first exhibited by this substance (which the Greeks called *ἤλεκτρον*) added to its mystery. It was even believed by some of the philosophers to be possessed of a soul. The Arabs, noticing the same phenomena, gave it the name in their language of *karabé*, catch-chaff. The Romans called it *succinum*, and the ancient Germans *glisum*. The ancient trade in amber is described in Sir George Cornewall Lewis's "Historical Survey of the Astronomy of the Ancients" (London, 1862). Amber is now generally understood to be a fossilized vegetable gum. The trees from which it exuded stood in forests of past epochs, and are now found forming strata of bituminous wood beneath beds of sand and clay. The wood is more or less impregnated with the amber; and this is also met with depending from the trunks in the form of stalactites, and again in rounded pieces mixed with pyrites and coarse sand under the layer of trees. Such a bed is worked as a mine for the amber near the coast of Prussia. The fossil stratum is from 40 to 50 feet thick, and is followed to the depth of 100 feet below the surface. In other countries it is found in beds of brown coal and of lignite; and it is probable that the pieces of it picked up on the seashores have been washed out from the extension of these repositories beneath the waters of the sea.—On the Prussian coast of the Baltic, between Königsberg and Memel, amber is more abundant than in any other known locality. From this source the great demand for this material in the Mohammedan countries is principally supplied. The trade was first appropriated by the grand masters of the Teutonic order, who often paid by it the whole expense of their court. After it became a royal monopoly it was guarded by most stringent laws; "strand riders" patrolled the coast, and a peasant concealing or attempting to sell a piece of amber he had found was hanged on one of a range of gallows kept standing *in terrorem*. Since the beginning of the present century the government monopoly has been farmed out to private contractors. Prosecution for theft may still be instituted against persons who retain pieces of amber they have picked up, and any one passing certain limits of the beach may be punished as a trespasser. The amber is washed ashore in considerable quantities near the village of Stürmen. Not only is it found in the sands on the shore, but also in the interior at a greater or less depth beneath the surface of the earth. At present the chief amber diggings in the north of Prussia are on the N. and W. coasts of Samland, N. E. of Königsberg. These are worked by an open excavation into the mountain near its base, in which the amber-bearing bed is laid bare, sometimes presenting a thickness of 2½ feet. Exhausted in one place, a new excavation exposes it in another. The fishing and picking of amber from the sea furnishes employment to great numbers of people. This is generally undertaken after a storm, when the swell of the waves is moderate. The workmen wade into the sea, and catch in nets the seaweed which is borne in by the waves. This is spread on the shore, where the women and children collect from it pieces of amber of various sizes, which is delivered by them to the superintendent. This mode of procuring amber is always less laborious and often more productive than digging. In winter, when the sea by the shore is covered with ice, the ice crust is broken through and the seaweed and amber are picked up through the opening. The fishers frequently go out in small boats when the supply near the shore fails, and in this way a large quantity of amber is found, though it is less valuable than that gained by digging. Bag nets are used in fishing for amber, and long spears in drawing large pieces out of the surf. The production in 1869 by digging, fishing, and spearing on the coast of Samland was 700 quintals. The dredging machines at Schwarzort on the Cur Flats obtained 795, and the diving at Brüsterort, between the Cur and the Fresh Flats, 215; making a total of 1,710 quintals, valued at 700,000 thalers. The diving apparatus used was placed in the Paris exhibition of 1867 by Capt. Rouquayrol Venayrouse, its inventor.—Amber is used almost wholly for small ornaments, as necklaces, and especially for the mouthpieces of pipes. A varnish is also prepared from it, as well as an oil used in medicine, and succinic acid, a useful reagent in chemical investigations, so called from *succinum*, the Latin word for amber. The largest piece of amber known is one weighing 13½ lbs., in the mineralogical museum at Berlin. The value of the specimens is not at all proportionate to their sizes. A piece of a pound weight might sell for $50, while one of 13 lbs. weight would readily bring $5,000.—Amber is of a yellow brownish or whitish brown color, transparent or translucent, and resembles rosin. Its specific gravity is 1·08. It is nearly as hard as calcareous spar, and is susceptible of a fine polish. When rubbed it becomes negatively electrical. Heated to 448° F., it melts, and then takes fire, burning with a yellow flame, and evolving much black smoke and an agreeable odor. The analyses that have been made of it give proportions of carbon varying from 70 to 80 per cent., hydrogen from 7 to 11, and oxygen from 7 to 8. Its principal ingredient is a resin insoluble in alcohol, which forms 80 to 90 per cent. of the whole. With this is found a resin soluble with difficulty in alcohol, and a trace of an odorous volatile oil. The products of its distillation are inflammable gases, water holding succinic and acetic acids and empyreumatic oil in solution (the spirits of amber of old pharmacy), sublimed succinic acid (salt of amber), and an empyreumatic oil (oil of amber). The residue is 12 to 13 per cent. of charcoal.—Pieces of amber are often met with containing the remains of insects that have become entangled in the substance when it was of thinner consistency. Their legs and wings are sometimes seen detached from the bodies, as if the insects had struggled hard to disengage themselves from the sticky mass. These insects resemble more those of tropical climates than such as are now known in the regions where amber is found. According to Tasche (1860), there have been found in amber 5 species of crustacea, 33 of myriapoda, and 205 of arachnida; of insects, 24 species of aptera, 60 of hemiptera, 8 of orthoptera, 87 of neuroptera, and, according to Loew (1864), 850 of diptera, the latter chiefly of the proboscidean division. Leaves of fern plants, and occasionally some mineral substances, are also met with in amber. Loew believes the amber fauna to be a fragment of a larger fauna, and chiefly found in sluggish waters and ponds and in rotting wood. —It is not known when the property possessed by amber of attracting light substances when rubbed was first noticed. It is spoken of by Thales of Miletus, Theophrastus, and Pliny. Electricity is excited to such a degree in the processes of working amber into the forms in which it is sold, that the workmen are affected with nervous tremors, and are obliged to change frequently the pieces they handle, that the excited electricity may be dispersed. —Amber has recently been discovered in various parts of Courland. It is also found in several other parts of Europe, Asia, and in E. Africa. False amber is sent from India to China, and is sold for nearly the same price as the genuine article. Amber is found at various places in the United States, occurring in the greensand formation and in the clays which succeed it, associated with lignite. The principal localities are at Amboy, N. J., at Gay Head on Martha's Vineyard, and at Cape Sable in Maryland.—The commerce in amber is divided by its tints, the bright yellow transparent variety being esteemed in Europe, while the clouded whitish yellow is preferred throughout Asia, far more than the other is elsewhere, not alone for jewelry, but for general decoration of personal utensils. It forms the favorite mouthpiece of the oriental tobacco pipe, from its presumed power of resisting infection, the more necessary where it is discourteous to wipe a pipe passed from one person to another, as much the symbol of amity as the calumet of our Indians. Singular to say, Americans follow the orientals in preferring the whitish mottled variety. Gum copal has been substituted for amber, which it resembles, but it can be distinguished by its enclosing modern insects, while amber holds only extinct varieties; also by copal burning steadily, while amber has marked scintillation.

AMBERG, a town of Bavaria, formerly capital of the Upper Palatinate, on both sides of the Vils, 35 m. E. of Nuremberg; pop. in 1871, 11,688. It is a neat and well built town, with a great number of churches, schools, colleges, hospitals, and other public buildings, a royal palace, an arsenal manufacturing from 10,000 to 20,000 stand of arms yearly, a salt magazine, manufactures of glass, iron, cotton, tobacco, stoneware, and hats, and important iron mines, yielding about 8,000 tons yearly. In the neighborhood of Amberg the rear guard of the

French under Jourdan was defeated by the archduke Charles, Aug. 24, 1796.

AMBERGER, Christoph, a famous German painter of Amberg (whence the name), born at Nuremberg about 1490, died at Augsburg in 1568. His best productions are his portraits, in the style of Holbein, whom he imitated. His historical paintings are small, and hard and sharp in style.

AMBERGRIS, a perfume, generally used in its alcoholic solution. It is a morbid secretion of the liver of the spermaceti whale, and is principally found floating upon the seas of warm climates intermixed with remains of the food of whales; it is also met with in the intestines of the whale. When of good quality it is of a bright gray color, streaked with black and yellow, so soft that it may be flattened in the fingers, and exhaling an agreeable odor if rubbed or heated. Its fracture presents a fine grain, its cut surface a waxy appearance. It is somewhat lighter than water, fuses at 140° to 150° F., and at a higher temperature gives out a white smoke, which condenses into a crystalline fatty matter. It contains about 85 per cent. of a peculiar fatty, fragrant substance called ambreine, which is extracted by boiling in alcohol, and separating the crystals that form in the cooled solution.—Persons engaged in whale fishing look for ambergris in the intestines of the spermaceti whale, and are most successful in finding it in those that appear torpid, sick, and lean; whence it would seem that the substance is a product of disease. It is in the lower part only of the intestinal canal, mixed with the fæces, that the substance is found. The lumps of it are from 3 inches to a foot in diameter, and from 1 lb. to 20 or 30 lbs. in weight. The largest piece known was bought by the Dutch East India company of the king of Tidore; it weighed 182 lbs. A piece weighing 130 lbs. was found inside of a whale near the Windward Islands, and was sold for £500 sterling. Genuine ambergris emits a fragrant smell when a hot needle is thrust into it. It also melts like fat to a uniform consistence. The counterfeit does not present these peculiarities.

AMBIORIX, one of the most famous of the Gallic chiefs who fought against Julius Cæsar toward the middle of the first century B. C. Conjointly with the superannuated Cativolcus, he was ruling over the Eburones, on the lower Meuse, when the country was invaded by Cæsar, who strove to corrupt him, but only made him dissemble while waiting his opportunity. During Cæsar's second excursion to England, Ambiorix organized an extensive conspiracy, which broke out after the Roman legions had gone into winter quarters. Having by stratagem induced one garrison to leave their fort, he massacred them to a man. He was about to attack another camp when Cæsar marched to its relief, and easily dispersed the assailants. Cativolcus took poison, but Ambiorix, with a few friends, made his escape into the forests.

AMBLETEUSE, a small decayed seaport of France, on the English channel, in the department of Pas-de-Calais, 5 m. N. of Boulogne. Here James II. landed on his flight from England in 1689. Napoleon, while meditating an invasion of England in 1804, attempted unsuccessfully to improve the harbor of Ambleteuse for his flat-bottomed boats. In the vicinity is the famous granite column erected by Napoleon to the grand army in 1805.

AMBOISE, a town of France, in the department of Indre-et-Loire, on the left bank of the Loire, 14 m. E. of Tours; pop. in 1866, 4,188. The town was rendered conspicuous at the opening of the French religious wars, in the 16th century, by the plot framed there against the Guises, known as the conspiracy of Amboise. The ancient castle, which has been the residence of several kings of France, stands on a rocky precipice, and is almost inaccessible. It is of Roman origin, was rebuilt in the 4th century, and lastly renovated by Louis Philippe. Abd-el-Kader was confined here during the greater part of his captivity. The town has manufactures of firearms and files.

AMBOISE, George d', a French statesman and cardinal, born at Chaumont-sur-Loire in 1460, died in Lyons, May 25, 1510. As a younger son he was destined for the church, and was titular bishop of Montauban at the age of 14, and later archbishop of Rouen. During the lifetime of Charles VIII. he belonged to the party of the duke of Orleans; and when the latter ascended the French throne as Louis XII. in 1498, Amboise at once became prime minister. He prevailed on the court of Rome to annul the marriage of Louis XII. with Jeanne de France, and received from Alexander VI. the cardinal's hat. He accompanied Louis XII. into Italy, and arranged the affairs of Milan after its conquest by the French troops. At the death of Alexander VI. he aspired to be pope, but the Italian cardinals passed him over, and elected first Pius III. and afterward Julius II., in spite of his lively antagonism, which threatened a schism. He left a large fortune.

AMBOYNA, or **Amboina** (Malay, *Ambon*, dews), an island in the Malay archipelago, the most important though not the largest of the Moluccas or Spice Islands, between lat. 3° 26′ and 3° 48′ S., and lon. 127° 57′ and 128° 27′ E.; length 35 m., average breadth 10 m.; area, about 300 sq. m.; pop. 32,000. A deep, narrow bay, called the bay of Binnen, 14 m. long, almost bisects it. The two halves are composed of high hills rising abruptly from the sea, and covered with tall, coarse grass, groves of the cocoa palm near the shore, and thick forests in the valleys and near some of the summits. The island is of primitive formation. It is subject to earthquakes every year, after which fevers commonly prevail, but in other respects the climate is very healthy. There are few animals except the wild hog, deer, and horse. Birds are abundant and of many species, and the coasts have long been famous for multitudes of beautiful shells. The commonest fruits are the cocoanut, mango, banana, nutmeg, and pineapple, the last having been introduced from the West Indies. Excellent indigo is raised, and the cajeput tree furnishes a medicinal oil. Indian corn has been introduced, and now forms with sago the staple food of the Malay natives. Cacao is extensively cultivated, and is rapidly supplanting the clove, of which, however, there are still valuable gardens on the hillsides. The production of cloves was once a valuable monopoly of the Dutch government. At the time of the Spanish occupation (1581-1607) it was immeasurably greater than it is now. The spice is cultivated on this island and the three little islands of Haraku, Saparua, and Nusalaut, lying immediately east of it, and the total yield of the four is about 785,000 lbs., of which Amboyna supplies about one third. The population of Amboyna consists principally of Malays, most of whom profess Mohammedanism. Savage aborigines called Horaforas still exist in the forest, and there are Chinese, Europeans, and half-breeds at the capital. The native villages are governed by rajahs appointed by the Dutch resident. The island was discovered by the Portuguese in 1515, was acquired by Spain in 1581, when Philip II. conquered Portugal, captured by the Dutch in 1607, and by the English in 1615, and retaken by the Dutch in 1622, when a horrible massacre of the English settlers took place, for which Cromwell afterward compelled the Netherlands to make compensation. In 1796 the island was once more taken by the British. They restored it at the peace of Amiens in 1802, seized it a third time in 1810, and it reverted finally to Holland in 1814.—**Amboyna,** the capital of the island and of the Dutch government of the same name, which includes Amboyna, Ceram, Amblauw, and Buro, is situated on the S. E. shore of the bay of Binnen, in lat. 3° 40′ S., lon. 128° 15′ E., 8 or 9 m. from the sea; pop. 14,060, of whom 9,000 are natives, 400 Arabs, 300 Chinese, and 700 nominally Europeans, though nine tenths of them are half-caste Dutch. The city has a pleasant aspect from the sea, occupying a level area, with broad, straight, and well shaded streets. It has a hospital, a public garden, and two Christian churches. The government is administered by a Dutch assistant resident, subordinate to whom are a rajah for the Malay population and a "captain China" for the Chinese. There is a fort called Nieuw Victoria. Good anchorage is found in the harbor, and the port is annually visited by about 200 vessels and praus of all kinds. There is a monthly mail steamer to Batavia. The imports, valued at $200,000 to $300,000 annually, consist chiefly of cotton goods and rice, and the exports of cloves, cocoa, cajeput oil, nutmegs, mace, and various kinds of wood. The port has been free since 1854, but the trade is much less prosperous than it was during the last English occupation.

AMBRACIA (now *Arta*), a town of ancient Greece, on the left bank of the Arachthus, N. of the Ambracian gulf (now gulf of Arta), which separated Epirus from Acarnania, though originally the town was included in the latter division. It was colonized by the Corinthians about 660 B. C., and early acquired importance. About the time of Alexander the Great it became subject to the kings of Epirus, of whom Pyrrhus made it his capital, and adorned it with public buildings. Having joined the Ætolian league, it was taken by the Roman conquerors in 189 and stripped of its works of art. At a later period its inhabitants were transported to the new city of Nicopolis, at the western extremity of the gulf, opposite Actium, founded by Augustus Cæsar to commemorate his victory over Mark Antony off the last named place. (See Arta.)

AMBRIZ, one of the divisions of the Portuguese colony of Angola in W. Africa; area, 89,300 sq. m.; pop. reported at about 2,100,000, but much less according to the official statements of the Portuguese government. The town of Ambriz, or Oporto do Ambriz, is at the mouth of the Loge or Ambriz river, in lat. 7° 52′ S. It was formerly the port of the small negro kingdom of Ambriz, the capital of which is Quibanza. The Portuguese annexed the town in 1855; in 1865 it contained 16 factories or trading stations, two of which were American.

AMBRONES, a nation of Gaul, who lived near the Alps between Switzerland and Provence. They joined the Cimbri and Teutones in their invasion of the Roman territories, and were routed, together with the latter, and almost annihilated, by Marius, in the battle of Aquæ Sextiæ (Aix), in 102 B. C. Their women, after a futile attack upon the Roman soldiers who were following in pursuit of the flying foe, offered to yield on the condition that their chastity should be respected. This proposition being rejected, they first slew all their children and then themselves.

AMBROSE, Saint, one of the fathers of the Latin church, born at Treves, in Gaul, in 340, died at Milan in 397. His father was the Roman governor of Gaul, but his mother was a Christian. He was trained to the law, and intrusted at an early age with the government of a province. His probity and wisdom in this public administration seemed to justify his removal to the place of bishop, although at the time of his election he had not even been baptized. The various objections and stratagems by which he tried to escape the honor thus pressed upon him were all disregarded; and at the age of 34 he was consecrated bishop of Milan, and continued to hold this office until his death, a period of more than 22 years. His predecessor, Auxentius, was an Arian. The sympathies of Ambrose, however, were with the supporters of the Nicene creed. He would not tolerate the Arian worship, and though he protected an Arian priest from the violence of the mob, he resisted the dictation of the empress Justina, who wished that an Arian bishop should be appointed for the city. He rebuked Valentinian, defied Maximus, and compelled Theodosius to a humiliating penance and submission. When all the officers of the court were silent upon the massacre which in a fit of anger Theodosius had ordered at Thessalonica, Ambrose declared to the emperor that his crime was beyond absolution without a special act of penance, and that the mass could not fitly be celebrated in such a presence. His boldness prevailed, and the emperor humbly obeyed his orders, and continued ever after to be his firmest friend. His contest with Symmachus is scarcely less remarkable. At the instigation of this learned man, then prefect of Rome, the senate took the occasion of a famine in 383 to ask that the pagan worship might be revived. Ambrose was prompt to throw against the scheme all the force of his authority and eloquence. He was by no means the equal of his adversary in graces of rhetoric and fulness of scholarship, but his earnestness, and perhaps in some degree his threatenings, won the cause.—The writings of Ambrose fill two folio volumes in the editions of Erasmus (Basel, 1527) and the Benedictines (Paris, 1686–'90). His moral teaching has throughout an ascetic tone, though less austere than that of the Greek fathers. He was hostile to all amusements and all pleasures of sense, and commended the monastic life as the truest way of Christian obedience and spiritual growth. He wrote treatises on "Widows," on "Virginity," on "Penance," and on the "Duties of Ministers," which satisfied the severe taste of Jerome much better than his seven books on "Faith and the Holy Spirit," which that harsh critic pronounced to be at once weak, fantastic, and stolen from the Greeks. His panegyrics, as we read them now, hardly justify his reputation for a wonderful oratory. Of his letters only a part have come down to us. They show very faithfully the character of the man, his moderation, courage, fidelity, practical wisdom, and unaffected piety. There was a dignity in his manner and bearing which made him appear at once like a ruler and a saint. Arbogastes, a Roman general, making war upon the Franks of the Rhineland, was asked by one of their chiefs whom he had conquered if he was a friend of Ambrose. From motives of policy he gave an affirmative answer. "No wonder that you have beaten us," was the reply, "since you have the favor of a man whom the sun itself would obey if he should command it to stand still." The most valuable legacies of Ambrose to the church were the hymns which he wrote and the improvements which he made in the method of chanting the sacred offices. The most famous of these are the morning song, *Æterne rerum Conditor;* the evening song, *Deus Creator omnium;* the Christmas chant, *Veni, Redemptor gentium;* and the short hymn to the Trinity, which Luther translated and adopted. These hymns of Ambrose are not to be praised for the beauty of their diction or for any artistic merit. They are rude, loose, and as far from the musical flow of later Christian rhyming as from the ancient finish of classic Latin verse. But their vigor, their fervor, their striking imagery, not less than their association with the revered name of their author, give them a place in the veneration of the faithful. The body of Ambrose is kept in the ancient basilica of Milan which bears his name, and his feast day is observed by the Latin church on the 7th of December, the day of his ordination as bishop. He has also the honor of a place among the saints of the eastern church, and his name is classed on their registers with the names of Basil, Athanasius, and the two Gregories.

AMBROSIA, in Greek mythology, the food of the gods, which was brought to Zeus by pigeons, and which conferred upon the dwellers on Olympus eternal youth and immortality. It supplied the place of all terrestrial comestibles. Favorites of the gods are recorded to have had it given to them as a great favor. It was also used by the gods to anoint their body and hair; hence we read of the ambrosial locks of Zeus.

AMBROSIAN CHANT, a method of singing hymns first introduced into the western church by St. Ambrose, about 386. Although generally supposed to be the foundation of all church music, it was in fact derived through the eastern church from the Greeks, and is so little known at this day, that it is impossible to say more of its general character than that it was constructed on the ancient Greek tetrachords, and embraced the four authentic modes, the four plagal or collateral ones being added by Gregory to form what is known as the Gregorian chant. The Ambrosian chant, and indeed all kinds of church music, were at first limited strictly to the performance of the psalms and doxologies, from an apprehension among the early fathers and bishops that heretical doctrines might creep into the services by the introduction of original hymns. Ambrose, however, in imitation of the Greek fathers, subsequently wrote several hymns, including, it has been erroneously supposed, the *Te Deum,* which he caused to be habitually sung according to the new method in his church; and St. Augustine, who was baptized there, speaks with great delight of the impression which the performance of the psalms and hymns made upon him. The Ambrosian chant continued to be used in the services of the church until about the commencement of the 7th century, when it was superseded by the new method adopted by Pope Gregory.

AMBROSIAN LIBRARY, a collection founded in Milan in 1609 by Cardinal Federigo Borromeo, archbishop of that city, and named in honor of St. Ambrose. It is especially rich in MSS., for the collection of which learned men were sent into all parts of Europe, and into Asia. A very large number of palimpsests belong to this library; some of them are exceedingly rare and valuable, among which may be mentioned Cicero's *De Republica*, fragments of his orations, and the letters of Marcus Aurelius and Fronto. The palimpsests were mostly obtained from the monastery of Bobbio, and were discovered by the librarian, Angelo Mai, in 1814. There is a MS. of Virgil, valuable for its marginal notes by Petrarch, among which is one relative to his first meeting with Laura. The library at present contains about 90,000 printed volumes and more than 15,000 MSS., besides a large collection of statuary, antiques, medals, and pictures. Among these are Raphael's cartoon of the "School of Athens" and the studies of Leonardo da Vinci. Many of the treasures of this library were carried to France during Napoleon's campaigns in Italy, and some of them have never been returned. A printing press is connected with the library, and several professors and editors are constantly engaged in collating and translating the MSS.

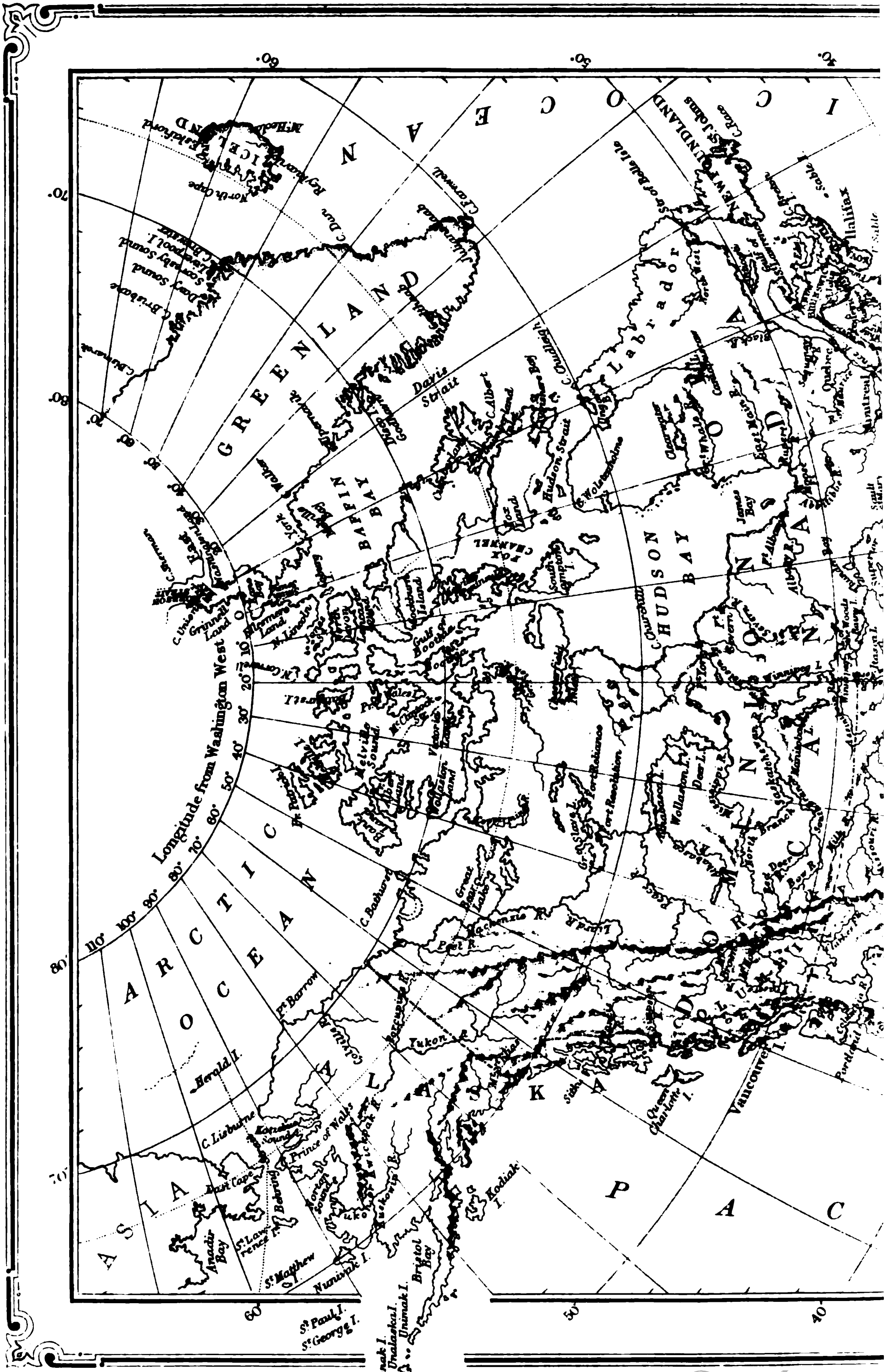
AMBULANCE (Lat. *ambulare*, to walk), a temporary and movable military hospital, formed on the field of battle for the immediate succor of the sick and wounded. The word is technically applied to covered wagons on springs, and to such other vehicles as are used for moving wounded men from the field of battle to the temporary hospitals, or for carrying the sick and wounded with the moving columns or to the permanent hospitals. The ambulance is a comparatively modern invention, due mainly to the French. Military surgery was formerly but little understood, and those who were wounded on the field of battle were left to the care of those around them, without any selection of fit persons for the duties of surgery. Nor do we find any trace of a regularly organized system of military hospitals, moving with the army, until the time of Henry IV. of France. The movable ambulances at first consisted of a cumbrous depot of surgical and medical appliances, kept with the baggage at a distance. At present two kinds of ambulances are recognized: one fixed or general, the other movable and light. The larger and reserved ambulances remain with the heavy baggage at some distance from the field of battle, and may be established either in permanent buildings or in large tents or temporary structures. In the late war in France the temporary hospitals fitted up in the palace of Versailles and in the public buildings of Paris were called ambulances. The lighter and more strictly movable ambulances accompany the soldiers on the field. The system was brought to its highest state of efficiency in the United States army during the civil war. The surgeons accompanying the troops are supplied with abundant means, such as lint, plaster, and bandages, for dressing wounds, and with the necessary instruments for surgical operations. Ambulances, or small spring wagons drawn by one or two horses (to which the term is in the United States commonly confined), and containing all the necessary appliances, including beds, for transporting two or more patients, follow close after the troops on the march and in approaching the field of battle. The ambulances of each division or corps d'armée are organized into a corps under the command of a subaltern of the line, styled ambulance officer. Railway cars and steamboats have been provided with beds and all other conveniences for carrying sick and wounded soldiers to the permanent and more distant hospitals. The American ambulance system, with local modifications, is now used by most civilized nations.

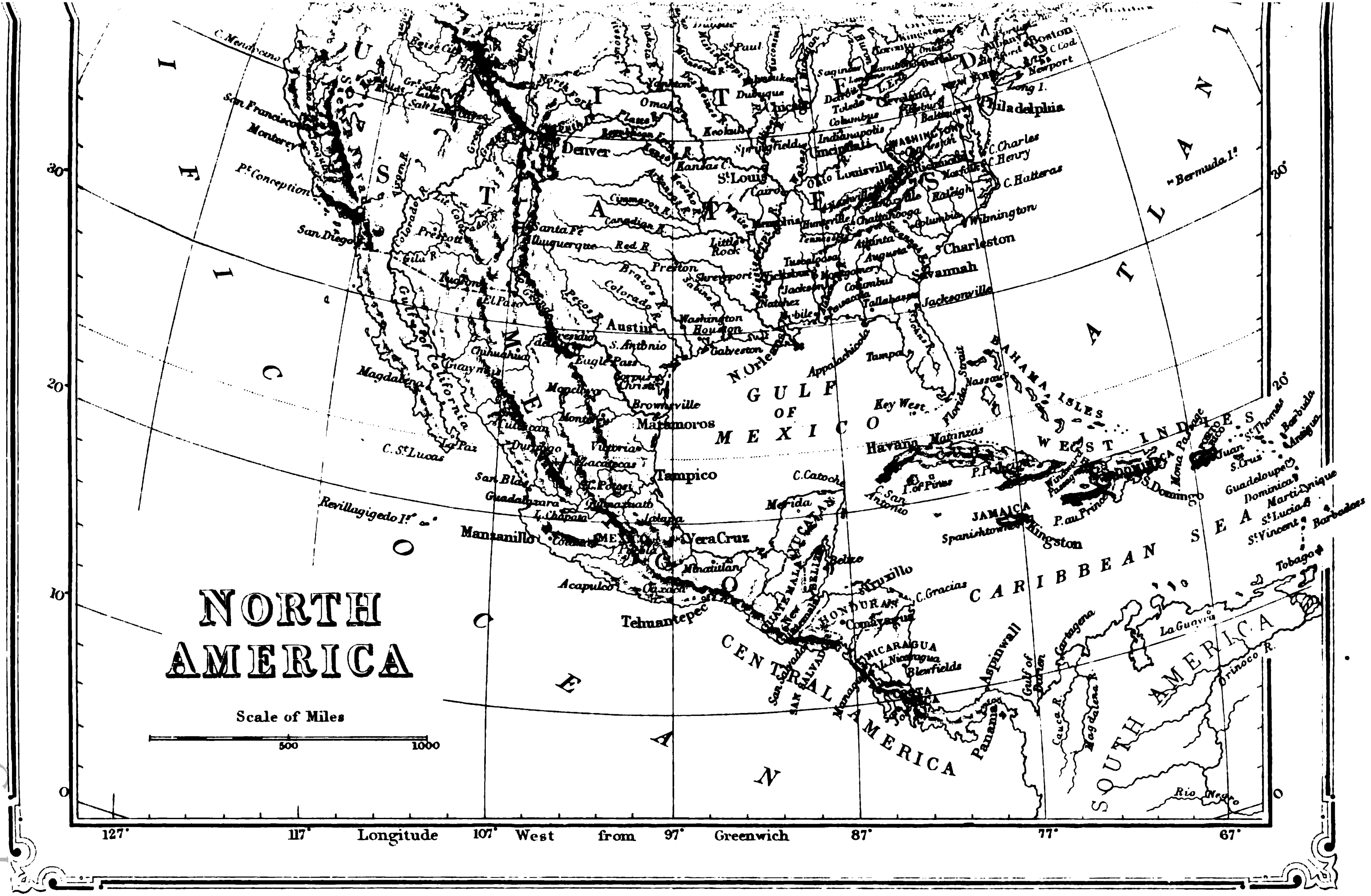
AMELIA, a S. E. county of Virginia, drained by the branches of the Appomattox river, which almost encircles it; area, 300 sq. m.; pop. in 1870, 9,878, of whom 6,823 were colored. It is intersected by the Richmond and Danville railroad. The surface is somewhat diversified. The productions in 1870 were 64,607 bushels of wheat, 70,509 of corn, 62,688 of oats, and 1,037,721 lbs. of tobacco. Capital, Amelia Court House.

AMELOT DE LA HOUSSAYE, Abraham Nicolas, a French author, born in Orleans in 1634, died in Paris, Dec. 8, 1706. After his return from Venice, whither he went in 1669 as secretary of an embassy, he devoted himself to history, politics, and philosophy. His principal work was a "History of the Government of Venice," besides which he wrote several volumes of miscellaneous memoirs, and translated four books of Tacitus, Machiavelli's "Prince," in the notes to which he spoke of his author as a great satirist, and Paolo Sarpi's "History of the Council of Trent," with very free annotations. This translation of Fra Paolo was attacked by the ultramontanists, who presented three memorials for its suppression, while it was defended and eulogized by the Gallicans. The "History of Venice," by its exposure of the secret policy of that republic, raised a great outcry there; and it is said that, through the intervention of the Venetian senate, Amelot was thrown into the Bastille.

AMELOTTE, Denis, a French writer, born in Saintes in 1606, died in Paris, Oct. 7, 1678. His life of Charles de Coudren, second general of the congregation of the Oratory, of which he was a member, contained some strictures on Duvergier de Hauranne, which brought him into collision with the Port Royalists. His influence with the chancellor Séguier prevented the publication of their translation of the New Testament, and in 1666–'8 a translation of his own in 4 vols. 8vo, with annotations, was published, which, although imperfect, was superior to any of its predecessors, and is still extensively used.

AMENOPHIS, Amunoph, or **Amen-hotep**, a name borne by three Egyptian kings belonging to the 18th dynasty, which commenced with Amasis or Aahmes I., about 1525 B. C. **I.** The second Pharaoh of that dynasty, who married the widow of Aahmes, continued the conquests begun by his predecessor, after the expulsion


ARCTIC OCEAN
ATLANTIC OCEAN
PACIFIC
GREENLAND
ICELAND
BAFFIN BAY
Davis Strait
Hudson Strait
HUDSON BAY
James Bay
Labrador
NEWFOUNDLAND
DOMINION OF CANADA
ALASKA
ASIA
Longitude from Washington West
Fox Channel
Southampton I.
Melville Sound
Banks Land
Victoria Land
Wollaston Land
Great Bear Lake
Gr. Slave L.
Athabasca L.
Winnipeg L.
Mackenzie R.
Peel R.
Yukon R.
Pt. Barrow
C. Lisburne
Herald I.
Kotzebue Sound
East Cape
Anadir Bay
St. Lawrence I.
St. Matthew
Nunivak I.
Bristol Bay
Kodiak I.
Unimak I.
Unalaska I.
Umnak I.
St. Paul I.
St. George I.
Queen Charlotte I.
Vancouver I.
Sitka
Halifax
Quebec
Montreal
Grinnell Land
Ellesmere Land
N. Lincoln
C. Bathurst
C. Churchill
60°
50°
40°
70°
80°


NORTH AMERICA
Scale of Miles
500
1000
Longitude West from Greenwich
127°
117°
107°
97°
87°
77°
67°
0
10
20
30
PACIFIC OCEAN
ATLANTIC
UNITED STATES
MEXICO
GULF OF MEXICO
CARIBBEAN SEA
WEST INDIES
BAHAMA ISLES
CENTRAL AMERICA
SOUTH AMERICA
C. Mendocino
San Francisco
Monterey
Pt. Conception
San Diego
Salt Lake
Denver
Omaha
St. Paul
Dubuque
Chicago
Keokuk
Springfield
St. Louis
Cairo
Kansas C.
Cincinnati
Indianapolis
Columbus
Toledo
Detroit
Cleveland
Buffalo
Pittsburg
Baltimore
Washington
Philadelphia
Long I.
Newport
Boston
C. Cod
C. Charles
C. Henry
C. Hatteras
Norfolk
Richmond
Raleigh
Wilmington
Columbia
Charleston
Savannah
Jacksonville
Augusta
Atlanta
Chattanooga
Nashville
Louisville
Huntsville
Tuscaloosa
Montgomery
Columbus
Tallahassee
Pensacola
Mobile
Jackson
Vicksburg
Natchez
N. Orleans
Little Rock
Shreveport
Preston
Washington
Houston
Galveston
Austin
S. Antonio
Eagle Pass
Corpus Christi
Brownsville
Matamoros
Santa Fe
Albuquerque
Red R.
Canadian R.
Cimmaron R.
Arkansas R.
Brazos R.
Colorado R.
Pecos R.
Sabine R.
El Paso
Tucson
Gila R.
Prescott
Bermuda I.
Appalachicola
Tampa
Key West
Florida Strait
Nassau
Havana
Matanzas
I. of Pines
C. San Antonio
C. Catoche
Merida
Yucatan
Belize
Chihuahua
Guaymas
Gulf of California
Magdalena
La Paz
C. St. Lucas
Culiacan
Durango
Monclova
Monterey
Victoria
Zacatecas
S. Potosi
Tampico
San Blas
Guadalaxara
L. Chapala
Guanaxuato
Jalapa
Vera Cruz
Mexico
Colima
Manzanillo
Revillagigedo Is.
Acapulco
Oaxaca
Minatitlan
Tehuantepec
Guatemala
San Salvador
Honduras
Comayagua
Truxillo
C. Gracias
Nicaragua
L. Nicaragua
Blewfields
Costa Rica
Aspinwall
Panama
Gulf of Darien
Cartagena
Cauca R.
Magdalena R.
La Guayra
Orinoco R.
Rio Negro
Jamaica
Kingston
Spanishtown
P. au Prince
S. Domingo
Mona Passage
Windward Passage
Porto Rico
S. Juan
St. Thomas
S. Cruz
Barbuda
Antigua
Guadeloupe
Dominica
Martinique
St. Lucia
St. Vincent
Barbadoes
Tobago

of the Hyksos, in southern Canaan; subdued the Shasu of the desert east of Egypt; and made an expedition toward Ethiopia, to extend the southern frontiers of his kingdom, and restore the financial prosperity of the country destroyed by the shepherd kings. He reigned 21 years (1499–1478). **II.** The son and successor, in 1414, of Thothmes III., and father of Thothmes IV., of whom little is known. His reign was short. **III.** The son of Thothmes IV., devoted himself during a reign of at least 36 years (about 1400–1364) to the improvement of his kingdom. Ancient Egypt was never so prosperous nor so extensive as under his administration. It extended into Syria as far as the western bank of the Euphrates, and south, embracing a part of Ethiopia. Monuments of the greatness of Amenophis III. exist all over Egypt, among them the two large colossi, one of which is celebrated as "the vocal Memnon."

AMERBACH, Johann, a German printer, born in Swabia, died about 1520. He was educated in Paris, and established his press at Basel in 1481, publishing the works of St. Ambrose (1492), and the first collected edition of the writings of St. Augustine (1506), from which the name of St. Augustine type was given to a variety of large letter used in the book. He proposed to publish the works of Jerome also, and to this end had his three sons thoroughly educated in Hebrew, Greek, and Latin. The edition was, some years after his death, issued by Froben. Amerbach was one of the first to substitute the Roman for Gothic and Italic letters.—His son Bonifaz (1495–1562), professor of civil law at Basel, was one of the most intimate friends of Erasmus and his general legatee. He was distinguished as a Latin and Greek scholar and writer.

AMERICA, one of the four great recognized continental divisions of the globe. It is bounded N. by the Arctic ocean; E. by the Atlantic, which separates it from Europe and Africa; W. by the Pacific, which separates it from Asia; and S. by the Antarctic ocean. The longer axis of the American continent runs almost due north and south. Measured on its central line, lon. 70° W., its length from the arctic regions to Patagonia is about 10,500 m. From east to west it presents two shorter axes, each of something more than 3,000 m.: one from Labrador to British Columbia, nearly in lat. 51° N.; the other between Capes St. Roque in Brazil and Parina in Peru, in about lat. 5° S. The American continent is separated into two not very unequal parts by the isthmus of Darien or Panama, less than 30 m. wide at its narrowest point. All north of this isthmus (taken in its more extended sense) is known as North America; all south of it as South America; the greater part of the isthmus itself being styled Central America. Estimates of the area of America vary considerably, some authorities making it a little more than 14,000,000 sq. m., others raising it, including Greenland, to more than 17,000,000 sq. m. It may be set down at 15,000,000 sq. m., of which about 8,000,000 are in North America and 7,000,000 in South and Central America. The area is thus about four times that of Europe, nearly a third greater than that of Africa, and about six sevenths that of Asia. Geographically, America lies within the arctic, the northern and southern temperate, and the tropical zones. About one seventh is unavailable for cultivation; the remainder is not surpassed in capacity to sustain life by any equal area of the globe. The population, including that of the islands, is about 85,000,000, not far from $\frac{1}{15}$ that of the entire globe.—The geology of America is worthy of careful study. The oldest strata are a range of crystalline rocks which crop out from the St. Lawrence and the great lakes to the Arctic ocean; these consist chiefly of gneiss, granite, and trap. In North America this primary range is about 1,500 miles in length, with a breadth of 200, seldom reaching an elevation of 800 feet. It forms the western slope of the Andes and Rocky mountains. It extends over the eastern part of South America, hidden in the valley of the Amazon by alluvial deposits. In the central portion it dips under the Silurian strata, but is free from superincumbent deposits, showing that even in the Silurian age it formed dry land, and has suffered less disturbance than is manifested in most other formations. The Silurian rocks, consisting of sandstone, limestone, slate, shale, &c., are divided into several periods, and abound in fossil remains. The Silurian strata dip under the Devonian, which are in parts overlaid with conglomerate. The latter forms the basis of the carboniferous strata which occupy large portions of Pennsylvania and the valley of the Mississippi. At the close of the carboniferous period the continent, nearly as large as at present, was scarcely elevated above the ocean. The great mountain ranges are of more recent origin. They were forced through the Silurian, Devonian, and carboniferous strata, dislocating and disturbing the hitherto horizontal layers. It is where the ancient rocks have been penetrated by masses of igneous rock that the precious metals are usually found. The volcanic fires have long since been extinct in the Appalachian range; but proofs of their former existence are found in the metamorphosed Silurian and carboniferous rocks of New York and Pennsylvania, which were long supposed to be primary granite. This igneous force still manifests itself in the volcanoes of the Andes and Cordilleras. Volcanoes still active, at greater or less intervals, mark the whole of the Andean range from Chili to Alaska, the most intense action within the historical period being in Ecuador, within two or three degrees of the equator. Here is the volcano of Cotopaxi, one of the two or three in constant eruption.—The animals native to America differ in many respects from those of the other hemisphere. This is especially the case with the larger species. The elephant, hippopotamus, and rhinoceros of the eastern continent are in America represented by the much smaller tapir; the camel and dromedary by the llama and vicuña; the lion and tiger by the jaguar and panther. Of the carnivora the bear is the only species in America which exceeds its congeners in the other hemisphere, the grisly bear of California being the largest of its species. The American bison exceeds in size any others of its kindred, and the largest members of the deer family are natives of America. Among the carnivora native to America are the grisly, white, black, and brown bears; wolves and foxes of various species; the puma, jaguar, lynx, and wild cat. Of the marsupalia, there is every variety of the opossum; of the rodentia, the beaver, hare, marmot, mouse, porcupine, and squirrel; of the ruminantia, many varieties of deer, among which are the moose or elk and reindeer, the bison, musk ox, sheep, goat, and antelope. The quadrumana (apes) differ specifically from their congeners on the eastern continent; all of them have long tails, and many prehensile tails, which is a peculiarity of American species. The horse and ox are introductions from Europe. Among the birds there are some species, as the wild turkey, toucan, and humming bird, peculiar to America. There are eagles, and others of the same family, vultures (among them the great condor of the Andes), ravens, crows, and an immense variety of the smaller birds, few of them being identical with those bearing the same names in Europe and Asia. Serpents are numerous. Among these are the great boa and the rattlesnake, peculiar to America. Alligators swarm in the tropical and subtropical rivers; turtles in the tropical seas. The lakes and streams are prolific in fish, among which the salmon have a wide range. The cod fisheries of the banks of Newfoundland are unequalled in productiveness. Some regions are infested with insects, especially mosquitoes. There is a native wild bee, but the common hive bee was introduced from Europe.—The vegetable productions of America are very numerous. The pine, oak, and maple are characteristic of the temperate regions; palms, of many species, of the tropical. In some parts of southern America the trees are so knotted together by twining plants as to render the forests impenetrable to wild animals, except through narrow paths which they have constructed. Maize is the only important cereal native to the new world. Nearly all the fruits of the old world have been introduced into America, where they flourish in their appropriate latitudes. The vine is a native, and within a few years its cultivation has received great attention.—We proceed to give more detailed statements under the general divisions of the continent. I. North America extends from the arctic region southward to near lat. 15° N. It is bounded N. by the Arctic ocean, E. by the Atlantic and gulf of Mexico, S. by the gulf and Central America, and W. by the Pacific. Its entire eastern coast line from Barrow strait to the southern extremity of Mexico, including the shores of Hudson bay and the gulf of Mexico, is about 13,000 m.; the western coast, being less deeply indented, has a shore line of not more than 11,000 m.; or 24,000 in all. Reclus, counting in the adjacent islands, gives the shore line of North America as 29,969 m.; South America, 16,012; together about one third more than that of Asia, about three times that of Africa, and considerably more than twice that of Europe. To the maritime system of North America properly belong also the great lakes, or inland seas, which it is estimated contain a third of all the fresh water of the globe.—North America has three main systems of mountains and watersheds, which divide it into four great hydrographical basins: 1, that which empties its waters into the Pacific ocean; 2, into the Arctic; 3, into the Atlantic; 4, into the gulf of Mexico. Each of these great basins is divided into two or more parts. The Rocky mountain range, skirting the Pacific coast, is a continuation of the Andes of South America. At the isthmus of Panama it sinks low, rarely attaining the height of 1,000 ft., with depressions of less than half that altitude. From the isthmus the range rises gradually, through Mexico and the United States, up to lat. 60° N., where it begins to sink into the Arctic basin. This mountain range bears different names in different parts of its course. Through Mexico, where it forms a broad table land, it is known as the Mexican Cordilleras. It is only in the United States and the British possessions that it bears the specific name of Rocky mountains. The Spaniards designate the whole as the Sierra Madre (Mother Range). Its general elevation is from 5,000 to 9,000 ft., with many summits much loftier. Among these are Orizaba and Popocatapetl in Mexico, which exceed 17,000 ft., and several in the United States and British America of from 12,000 to 18,000 ft. Mt. St. Elias, about lat. 60° N., reaches or surpasses the height of 17,850 ft. This range follows the shore line at various distances, the greatest deviation being about lat 40° N., where the Pacific slope of the Rocky mountains has a breadth of some 600 m., upon which are situated the states of California and Oregon, and the territories of New Mexico and Utah. The Rocky mountain range is not a single ridge, but rather, like the Cordilleras of South America, a parallel pair of ridges. Between the two lies the isolated basin of the Great Salt lake. As the Rocky mountains run so near to the coast of the Pacific, the rivers flowing from them, draining only a small area, are necessarily small. The Columbia and Sacramento, flowing directly into the Pacific, and the Colorado, flowing into the gulf of California, are the only ones of any considerable size. The Yukon, although flowing into Behring sea, a part of the Pacific ocean, belongs to a different hydrographical system. Skirting the Atlantic coast is the Appalachian range. Starting from the promontory of Gaspé, on the gulf of St. Lawrence, it runs southwestward for 1,300 m. to northern Alabama, where it sinks to the level of the gulf slope. The Appalachian system consists of several parallel ridges, divided into two main lines. The eastern ridge is made up of the Green mountains of Vermont, the Highlands of New York, the South mountains of Pennsylvania, and the Blue Ridge of Virginia, North Carolina, and Georgia. The western ridge comprises the Adirondack, Catskill, Alleghany, and Cumberland ranges. Between these two ridges lies an almost continuous valley, with a breadth of from 15 to 60 miles, designated in various parts as the valleys of the Champlain, the Hudson, the Cumberland, the great valley of Virginia, and the valley of Tennessee. The general tendency of the Appalachian ridge is to a greater elevation as it runs southward; the White mountains of New Hampshire being merely an isolated projection from the central mass of the Green mountain range. Except in a few points this range rarely reaches an elevation of 4,000 ft. Mount Mansfield, the highest summit of the Green mountains, is 4,359 ft.; Mount Marcy, the highest of the Adirondacks, 5,337; Mount Washington, the loftiest of the White mountains, 6,285, an elevation exceeded by many points near the southern extremity of the chain, the highest being Mitchell's peak, in North Carolina, 6,732 ft. The Appalachian chain is pierced at intervals by gaps which give passage for rivers, canals, and railways, linking the Atlantic slope with the valley of the Mississippi. The Appalachian ridge forms the watershed between the streams which flow into the Atlantic, with the exception of the St. Lawrence, and those which fall into the Mississippi, and thence into the gulf of Mexico. Several of these rivers are of considerable size, such as the Merrimack, Connecticut, Hudson, Delaware, Susquehanna, Potomac, and James. The Atlantic slope of North America, from the St. Lawrence to Florida, varies in width from 50 to 200 m., the mean elevation of its upper margin being from 150 to 1,000 ft. Throughout its whole extent it is without marked transverse ridges. The Rocky mountains and the Appalachians form two sides of a triangle, only the latter is broken off without reaching the point of junction. The third side of this triangle is formed by a broad low swell, without any defined crest, and rarely reaching the elevation of 1,500 ft. This swell, starting from the eastern base of the Rocky mountains in about lat. 50° N., runs eastward, separating the waters which fall into the Arctic ocean and Hudson bay from those which find their way into the gulf of Mexico. So gradual is the rise that we can define its summit only by noticing whether the general course of the streams is northward or southward. This low swell divides the continent of North America east of the Rocky mountains into two nearly equal parts, the northern half of which is almost all incapable of cultivation. A little west of the head of Lake Superior this swell divides. One branch sweeps southeastward; the other northeastward, forming between them the basin of the lakes whose waters pass through the St. Lawrence into the Atlantic. So slight is the elevation of the southeastern watershed that a canal with no cutting of more than 100 feet would open an outlet for the waters of Lake Superior, Michigan, Huron, and Erie into the Mississippi, and thence to the gulf of Mexico, instead of into Ontario, and through the St. Lawrence into the northern Atlantic. The lake basin of North America is thus closely connected with that of the Mississippi. Between the eastern slope of the Rocky mountains and the western slope of the Appalachian range lies the basin or valley of the Mississippi. This is in some respects the most notable on the globe. Its area is about 1,250,000 sq. m., being only exceeded in extent by the valley of the Amazon. Latitude, elevation, and rainfall combine to render every part of it capable of supporting a dense population. Next to it in this respect comes the basin of the Plata in South America. The most striking physical feature of the basin of the Mississippi is its uniform plain-like character. From the mouth of the river to its sources there is nothing like a mountain. At its junction with the Missouri it is but 381 ft. above the level of the sea; at its source in Lake Itasca it is 1,680 ft., the average descent for the whole distance being less than eight inches to the mile. Its great affluent, the Missouri, from Fort Benton to the junction, falls only ten inches to the mile. The Ohio, from Pittsburgh to its mouth, falls less than five inches to the mile. The Red river falls a little more than a foot, the Arkansas not quite two feet to the mile. Except on its exterior rim, the basin drained by the Mississippi and its main branches falls less than six inches to the mile. The consequence is that there are no rapids to obstruct navigation, each river being navigable as far as the depth of water will permit. The entire navigable length of these rivers is about 40,000 m. The hydrography of the remaining regions of North America is of little consequence, the Rio Grande being the only other river of any importance upon the eastern side.—With the exception of purely tropical productions, North America has nearly every species of grain, fruit, and vegetable. It has given to the eastern continent maize, which next to rice is the cereal which enters most largely into human consumption, directly as an article of food, and indirectly as sustenance for animals.—North America is rich in nearly every valuable mineral. Iron is so widely diffused, especially within the United States, that it may be considered universal. Copper is found in many localities, the most abundant deposits being in the region of Lake Superior. Gold and silver have been found in every part of the Rocky mountain and Appalachian chains, the deposits in Mexico, California, and the adjacent regions probably exceeding those of all the rest of the globe. Lead is found in various parts, the main locality, probably the most productive in the world, being in Illinois, Iowa, Missouri, and Wisconsin. Quicksilver has hitherto been found chiefly in Mexico and California, where the mines equal in productiveness those of Austria. Zinc has been found only within a limited area, mainly in New Jersey and Pennsylvania. Tin is the only valuable metal which does not occur in large quantities. The coal fields of North America comprise more than seven eighths of all known to exist. Those already explored exceed the entire area of Great Britain. Salt is widely diffused, the principal saline springs being in New York, Virginia, and Michigan. Petroleum, which may properly be classed among mineral substances, abounds within a comparatively limited area, the central point being in northern Pennsylvania, thence extending northward and westward.—Politically North America is divided into British America, the United States, and Mexico. British America occupies the whole northern half, with the exception of Alaska, the extreme northwestern angle, formerly Russian America, but now by purchase belonging to the United States. It is bounded N. by the Arctic ocean, E. by Davis strait and the Atlantic, S. by the United States, and W. by Alaska and the Pacific (where its shore line is very narrow, only about 350 m.). Its entire area is about 3,500,000 sq. m.; but with the exception of a border on the St. Lawrence and the lakes, and a very narrow strip on the Red river, and a portion on the Pacific, the whole of British America lies north of the line of cultivation. The population is 4,455,000, of which the larger part are of European descent. Nearly all of habitable British America is now consolidated as the Dominion of Canada.—The United States occupy the central part of North America, from the Atlantic to the Pacific. They are mainly bounded N. by British America (Alaska occupying an isolated position), S. by Mexico, E. by the Atlantic, and W. by the Pacific. The total area, including Alaska (580,107 sq. m.), is about 3,600,000 sq. m. The population by the census of 1870 is 38,558,371, of whom 33,589,377 are white, 4,880,009 colored, 63,254 Chinese, and 25,731 settled Indians.—Mexico is bounded N. by the United States, E. by the gulf of Mexico and the Caribbean sea, W. by the Pacific, and S. by Central America. It has an area of nearly 800,000 sq. m., and a population estimated in 1868 at 9,173,052, of whom more than half are set down as Indians, and only about 1,000,000 whites, the remainder being of mixed blood and negroes. II. CENTRAL AMERICA, occupying the greater part of the isthmus of Darien, comprises the states of Guatemala, San Salvador, Honduras, Nicaragua, and Costa Rica, which since 1863 have formed a loose political union, under the name of States of Central America. They contain about 175,000 sq. m., with a population estimated in 1865 at 2,665,000, of whom 1,500,000 are Indians, 1,000,000 of mixed blood, 130,000 whites, and 35,000 blacks. Central America lies wholly within the tropics; but many parts of it are sufficiently elevated to give a temperate climate. III. SOUTH AMERICA extends from Cape Gallinas, lat. 12° 30′ N., to Cape Horn, lat. 55° 59′ S., its extreme length being 4,550 m. The distinguishing physical feature is the chain of the Andes or Cordilleras, which borders the whole W. coast, at a distance of from 50 to 100 m. from the shore, gradually sinking at the southern extremity to the level of the ocean, a few summits appearing as rocky islands. From lat. 22° S. northward the range widens, spreading into a series of ridges generally parallel, the westernmost ridge, almost continuous, being the Andes proper, or Cordillera of the coast. The main line follows, or rather constitutes the isthmus of Panama, an offshoot striking northeasterly to the Caribbean sea. This last is divided into several parallel ridges, through the intervening valleys of which the Atrato and the Magdalena flow northward into the Caribbean. The general chain is nowhere broken through, and thus forms a complete separation between the waters which flow into the Pacific and those which fall into the Atlantic. On the Pacific side there is no considerable river. From the eastern base of the Andes several ranges of highlands divide the whole country into a number of shallow basins. Topographically South America is divided into seven distinct regions: 1. The shore of the Pacific, 50 to 100 m. in breadth, the extremities of which are fertile, the centre being a sandy desert. 2. The elevated table lands lying between the folds of the main Andes and the other Cordilleras; the chief of these are those of Quito and Bogotá. 3. The basin of the Orinoco, a series of llanos, or level plains thinly wooded, but covered during the wet season with late herbage, which withers in the dry season, when the heat is intense. 4. The great basin of the Amazon, covering about 2,000,000 sq. m., for the most part densely wooded and thinly peopled. 5. The basin of the Rio de la Plata, a series of plains, known as pampas, the river banks clothed with forests, and the interior covered with luxuriant grass, which supports immense herds of cattle, millions of which are annually slaughtered for their hides. The cattle here probably excel in number those of all the rest of the globe. 6. The mountainous region of E. and S. Brazil, extending from the Atlantic to the interior, where it almost imperceptibly joins with the two former regions. 7. Patagonia, occupying the whole breadth of the continent from about lat. 40° S. to Cape Horn. This region is almost wholly unexplored. The Argentine Confederation claims dominion over a great part of it; but practically it is inhabited only by savages, with scarcely a trace of even a tribal government. About three fourths of South America lie geographically within the tropics; but the

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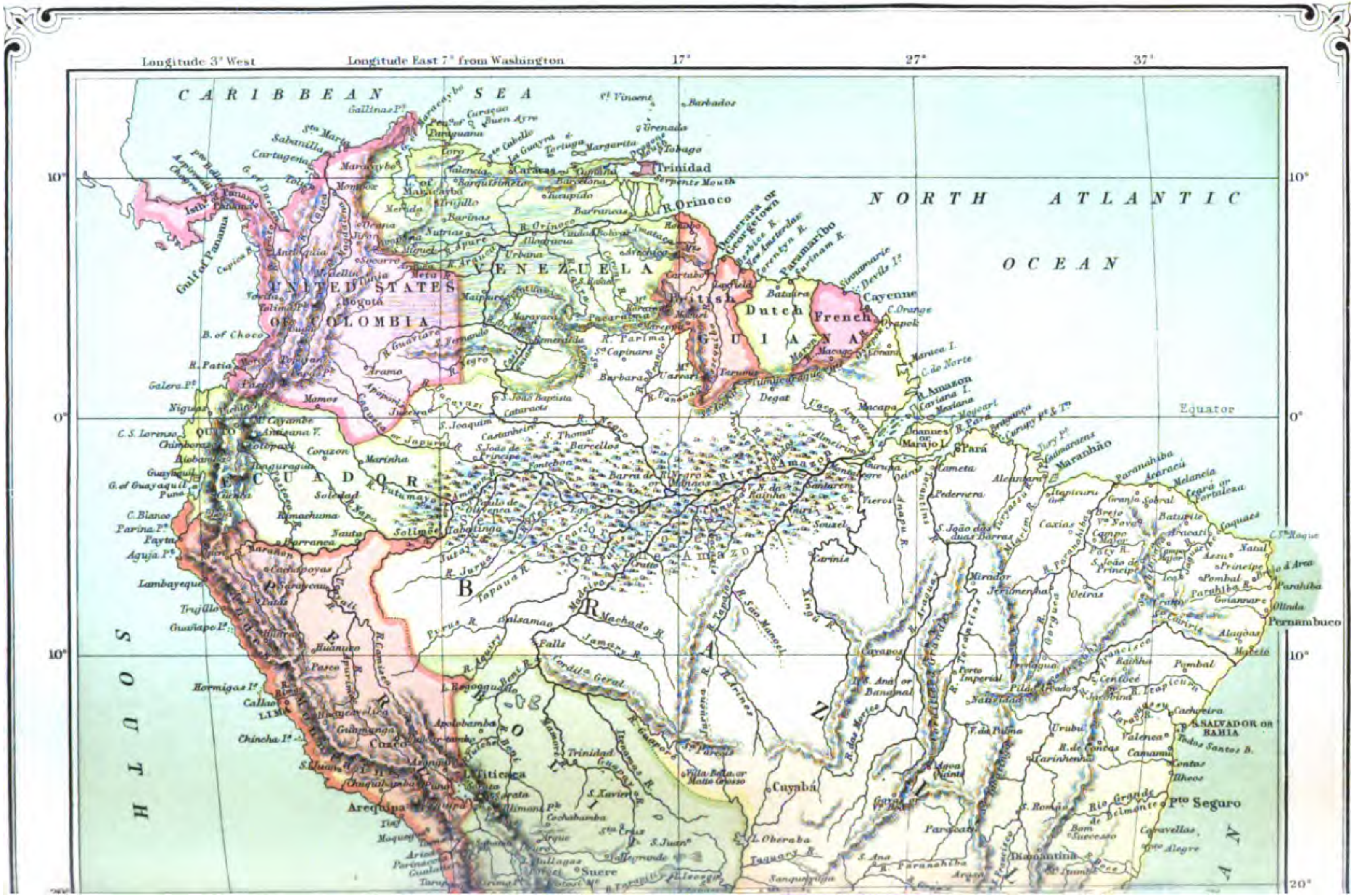
Longitude 3° West
Longitude East 7° from Washington
17°
27°
37°
10°
0°
10°
20°
Equator
CARIBBEAN SEA
NORTH ATLANTIC OCEAN
SOUTH
UNITED STATES OF COLOMBIA
VENEZUELA
GUIANA
British
Dutch
French
ECUADOR
PERU
BOLIVIA
BRAZIL
Trinidad
Barbados
Grenada
St. Vincent
Tobago
Margarita
Curaçao
Caracas
Bogotá
Quito
Lima
Callao
Arequipa
Cuzco
Sucre
Titicaca
Cayenne
Pará
Maranhão
Pernambuco
S. Salvador or Bahia
Pto. Seguro
Cuyabá
R. Orinoco
R. Amazon
Rio Negro
R. Madeira
R. Tocantins
R. Xingu
R. Tapajos
R. São Francisco
Gulf of Panama
Isth. of Panama
G. of Darien
G. of Guayaquil
B. of Choco
C. S. Roque
Cartagena
Sta. Marta
Maracaybo
Guayaquil
Manaos
Santarem
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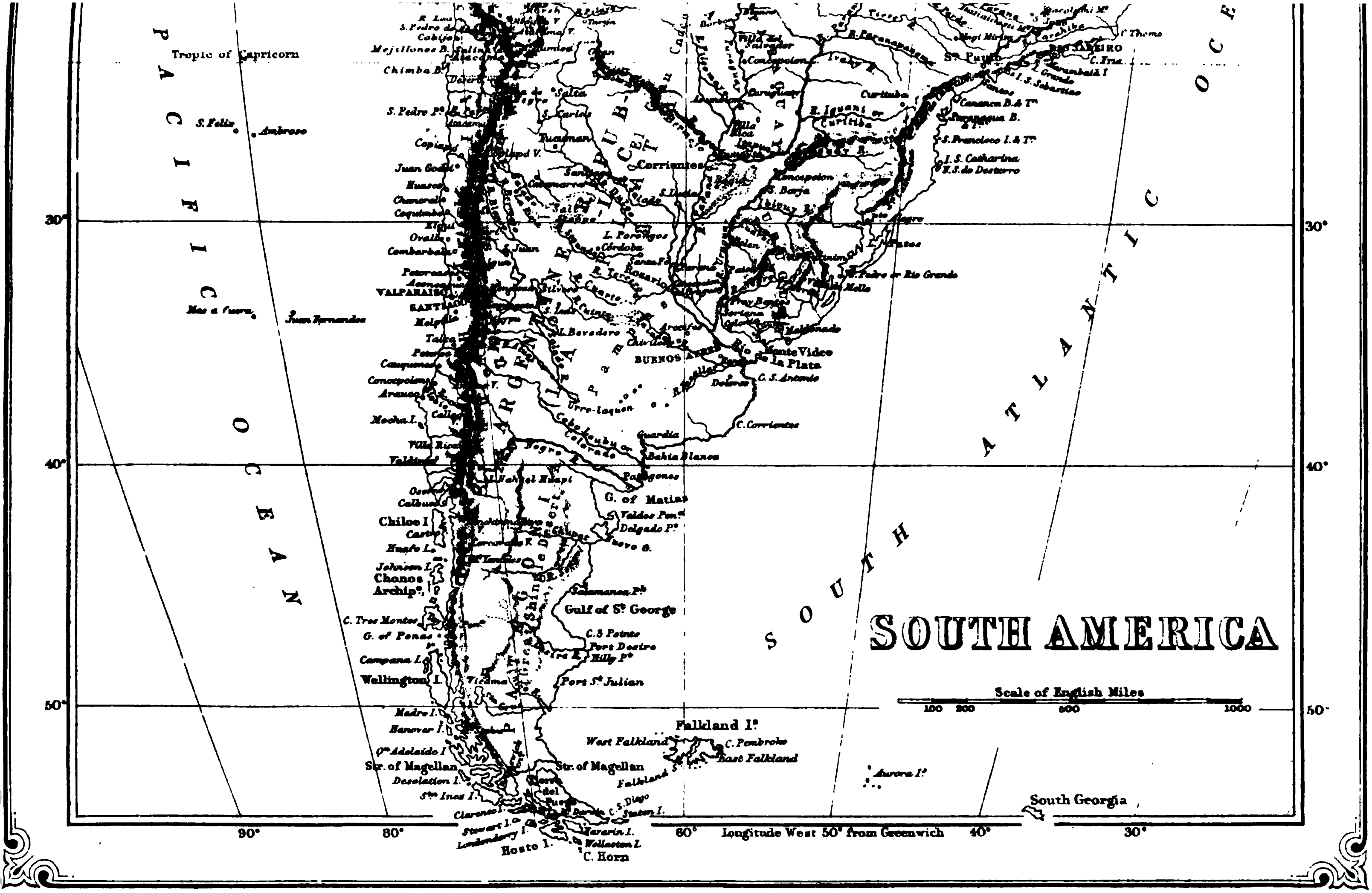
SOUTH AMERICA
Scale of English Miles
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Longitude West 50° from Greenwich
90° 80° 60° 40° 30°
30° 40° 50°
Tropic of Capricorn
PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
S. Felix
Ambrose
Mas a fuera
Juan Fernandez
Mejillones B.
Chimba B.
S. Pedro Pº
Copiapo
Juan Godoy
Huasco
Chanaral
Coquimbo
Ovalle
Combarbala
VALPARAISO
SANTIAGO
Talca
Concepcion
Arauco
Mocha I.
Valdivia
Osorno
Calbuco
Chiloe I.
Castro
Huafo I.
Johnson I.
Chonos Archipº
C. Tres Montes
G. of Penas
Campana I.
Wellington I.
Madre I.
Hanover I.
Qⁿ Adelaide I.
Str. of Magellan
Desolation I.
Sᵗᵃ Ines I.
Clarence I.
Stewart I.
Londonderry I.
Hoste I.
C. Horn
Wollaston I.
Staten I.
C. S. Diego
Tierra del Fuego
Falkland I.ˢ
West Falkland
East Falkland
C. Pembroke
Falkland S.
Aurora Iˢ
South Georgia
Port Sᵗ Julian
Port Desire
C. 3 Puntas
Gulf of Sᵗ George
Salamanca Pᵈ
G. of Matias
Valdes Pen.
Delgado Pᵗ
Bahia Blanca
Guardia
Patagones
C. Corrientes
Dolores
C. S. Antonio
La Plata
Monte Video
Maldonado
BUENOS AYRES
Rosario
Cordoba
Corrientes
Tucuman
Salta
S. Pedro or Rio Grande
I. S. Catharina
S. Francisco I.
Paranagua B.
Curitiba
Sᵗ Paulo
RIO JANEIRO
C. Frio
Cabo Frio
S. Borja
Concepcion
R. Iguazu
R. Paranapanema
Ivahy R.

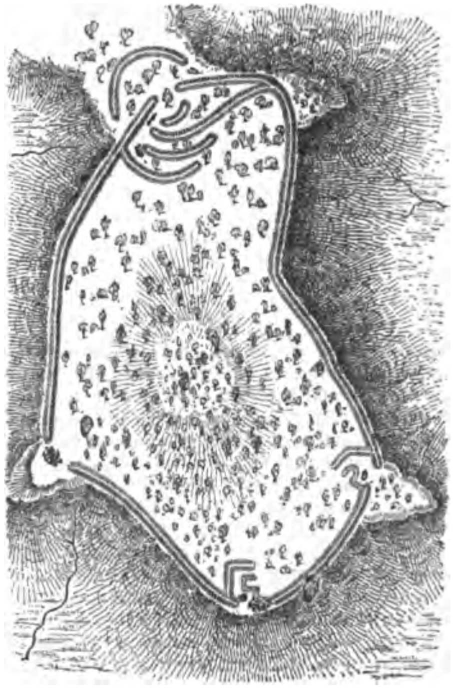
climate is greatly modified by the elevation.—With the exception of a small tract in the N. E. angle, comprising French, Dutch, and British Guiana, no part of South America is under the dominion of any foreign power. The present political divisions are eleven in number. We enumerate them in geographical order, commencing at the north: 1. Venezuela, in the north, bordering on the Atlantic and Caribbean sea; area, 425,000 sq. m.; pop. about 1,250,000. The only census ever taken was in 1847, when the population was 1,267,000, since which it has probably decreased somewhat owing to frequent revolutions. The bulk of the population are of mixed Indian and negro blood, hardly one in a hundred being put down as pure whites. 2. The United States of Colombia, formerly known as New Granada, bounded N. by the Caribbean sea and Central America, E. by Venezuela, S. by Brazil and Ecuador, and W. by the Pacific. It comprises the southern part of the isthmus of Darien, the Panama railroad running through it. Area, 500,000 sq. m.; pop. in 1864, 2,794,000, since which time partial enumerations indicate a slight increase. Most of the population is of mixed races. Those in whom European blood predominates over Indian are about 1,480,000; Indian over European, 440,000; Indian and negro, 440,000; pure Indian, 150,000; negro, 90,000. 3. The empire of Brazil, the only monarchy, stretching westward in its northern part from the Atlantic to Colombia, in its southern part to Bolivia. It includes the greater part of the basin of the Amazon. Area, 3,140,000 sq. m. The population is variously estimated at from 10,000,000 to 12,000,000. The best native authority gives it in 1867 at 11,780,000, of whom 9,880,000 were free, 1,400,000 slaves, and 500,000 uncivilized Indians. The proportion of people of mixed blood is small compared with other South American states. 4. Uruguay, bounded by Brazil, the Atlantic, and the Argentine Confederation; area, 75,000 sq. m.; pop. 300,000. 5. Paraguay, bounded by Bolivia, Brazil, and the Argentine Confederation, the only country with no seacoast; area, 70,000 sq. m.; pop. in 1857, 1,300,000, but since greatly reduced by war and famine. 6. Bolivia, extending from Brazil to the Pacific; area, 575,000 sq. m.; pop. 2,000,000. 7. The Argentine Confederation, extending from Bolivia and the Andes to the Atlantic; area, 600,000 sq. m.; pop. 1,800,000. 8. Patagonia, occupying the extreme southern end of the continent; area, 350,000 sq. m. The population is insignificant, consisting wholly of savages, destitute of any organized government. All the foregoing states are E. of the Andes. The remaining ones are on the Pacific shore, the summits of the range, and its eastern slope. 9. Ecuador, upon and just S. of the equator; area, 275,000 sq. m.; pop. about 1,300,000, of whom half are reckoned as whites, though many are of mixed blood. Its cultivated parts comprise a narrow strip on the Pacific, the elevated valley of Quito, between the ridges of the Cordilleras, and the eastern slope of the latter. Within its limits are several of the loftiest peaks of the Andes. 10. Peru, S. of Ecuador, crossing the Andes, and extending down the eastern slope; area, 600,000 sq. m.; pop. 2,500,000, of whom 15 per cent. are whites and 57 per cent. Indians. 11. Chili, occupying the narrow Pacific coast S. of Bolivia and W. of the Argentine Confederation and northern Patagonia; area, within its established limits, about 150,000 sq. m.; pop. in 1868, 1,900,000. IV. ISLANDS OF AMERICA. The islands not immediately adjacent to the mainland, which may be properly considered as belonging to the American continent, are grouped as follows: 1, the Greater Antilles, including Cuba, Hayti, Jamaica, and Porto Rico; 2, the Lesser Antilles, including Barbadoes and about 30 others; 3, the Bahamas, about 500 in number, most of them uninhabited. Their total area is not far from 100,000 sq. m., with a population of over 4,000,000. With the exception of Hayti, these are subject to different European powers. To these may be added Greenland, belonging to Denmark, the population of which numbers only a few thousands. —The area and population of the American continent may be summed up in round numbers as follows:

COUNTRIES.	Area, sq. m.	Population.
NORTH AMERICA.		
British America	3,500,000	4,455,000
Mexico	800,000	9,175,000
United States	3,600,000	38,558,000
Totals, North America	7,900,000	52,188,000
CENTRAL AMERICA.		
Costa Rica	20,000	135,000
Guatemala	40,000	1,180,000
Honduras	47,000	350,000
Nicaragua	58,000	400,000
San Salvador	10,000	600,000
Totals, Central America	175,000	2,665,000
SOUTH AMERICA.		
Argentine Confederation	600,000	1,800,000
Bolivia	575,000	2,000,000
Brazil	3,140,000	11,780,000
Chili	150,000	1,900,000
Colombia	500,000	2,800,000
Ecuador	275,000	1,300,000
Guiana	480,000	300,000
Paraguay	70,000	325,000
Patagonia	350,000	4,000
Peru	600,000	2,500,000
Uruguay	75,000	300,000
Venezuela	425,000	1,250,000
Totals, South America	7,240,000	26,259,000
ISLANDS	100,000	4,000,000
Totals, America	15,410,000	85,112,000

—The history of America, as authentically recorded, hardly goes back five centuries, or about 100 years before the colonization by the Europeans. For everything earlier we have only the ruins left by extinct races, and traditions in which the mythical element is predominant. It is certain that the Northmen visited Greenland as early as the 10th century, and planted a colony there, with which they maintained an almost continuous intercourse. They also sailed for some distance down the Atlantic coast; but there is no evidence that they ever reached further south than New England, or penetrated a score of miles into the interior. But wherever Columbus and his followers went, they found the country peopled more or less densely by a race or races to whom they gave the general appellation of Indians. When and whence they came is unknown. The widely spread race which we group together as Esquimaux bear a strong resemblance to the inhabitants of Siberia on the one side and those of Lapland on the other. They may have reached America from one side by way of Iceland, or on the other by crossing Behring strait; not impossibly by both. But in either case intercourse with their European and Asiatic kindred was early interrupted. There is little likelihood that any intercourse existed between the dwellers on Baffin bay and those on Behring strait. Both live mainly on the products of the sea—salmon in the one case, and seals in the other; consequently they never move far from the shore. There is no evidence that they have ever moved southward to more hospitable regions than those which they now inhabit. The name Esquimaux is of French origin. In the regions around Baffin bay they call themselves Innuits, which means simply folks. In almost every respect they differ widely from the tribes who were found spread over the whole of what now constitutes the United States E. of the Rocky mountains. The early explorers found this whole region peopled by a race homogeneous in physical character and way of life. It is clear, however, that they had been preceded by another race of a higher type. This race, known as the mound-builders, certainly occupied the whole extent of the valley of the Mississippi, and penetrated as far north as the copper region of Lake Superior, where they have left behind them evidences that they had made no inconsiderable advances in the art of working metals. Their principal memorials are found in the earthworks which they erected. Of these many thousands have been found in the single state of Ohio. Their number and magnitude prove them to have been the work of a numerous people organized into large communities. How and when this people disappeared is beyond even plausible conjecture. Passing southward, we come to Mexico, which was found occupied by a people more advanced in many respects than we can suppose the mound-builders to have been. The ruling race at the time of the conquest were the Aztecs; but they had occupied this place for only a few generations. They were apparently immigrants to the table land of Anahuac; but it is still a disputed question whether they came from the north or the south. Their civilization was undoubtedly engrafted upon an earlier one, to which the name of Toltec has been given. In the southern Mexican states of Yucatan and Chiapas, and in Honduras and Guatemala, are ruins of large cities which evince a still higher grade of culture. The existence of these great ruins shows that this region, where the present population is hardly ten to the square mile, was once densely peopled. In the part of South America E. of the Andes, the aboriginal population never attained to any form of civilization. That portion of South America occupying the elevated valleys between the various ranges of the Andes, within the present states of Peru, Bolivia, and Ecuador, was the seat of a civilization known as that of the incas. The time of its origin is variously stated; some place it back three or four thousand years or more; but a more probable date is about A. D. 1000. It was at its height at the period of the Spanish conquest. Taken as a whole, the civilizations of the prehistoric races of America are generally regarded as purely indigenous, having no connection with and but slight resemblance to those of any other peoples. (See AMERICAN ANTIQUITIES.)—The historical period of America as fairly written begins with the discovery of the West Indian islands by Columbus in 1492. In the course of different voyages he sailed for some distance along the shores of the continent. In 1497 the Cabots discovered Newfoundland, and coasted as far down as Florida. The Spaniards took the lead in conquest and partial colonization. Within half a century they took possession of the islands; Cortes conquered Mexico, Balboa and others Central America, and Pizarro and Almagro overran Peru. The Spaniards were adventurers rather than colonists; their chief object was gold, and they pushed mainly into the regions where this was found. They reached New Mexico before 1537. Brazil was formally occupied by the Portuguese in 1549, fell successively under the dominion of Spain and Holland, and was finally recovered by Portugal in 1654. The French took formal possession of Canada in 1534, and laid claim to the region westward and southward, including the valley of the Mississippi. The English were much later in colonizing. Their first permanent settlement at Jamestown was made in 1607. The Dutch and Swedes also, not long after, settled at a few points. In 1770 the American continent was divided among three European nations. England, having taken the French, Dutch, and Swedish possessions, held by claim the whole of North America, except Mexico. Spain held Mexico, Central America, and the whole of South America, except Brazil, which belonged to Portugal. Somewhat later, Russia acquired an extensive territory in the extreme N. W. of the continent. In 1775 began the series of revolts which in less than half a century almost entirely expelled the European governments, except Great Britain, from the continent of America. The thirteen British colonies rose in 1775, and proclaimed their independence in 1776, which was acknowledged in 1783. In 1807 the connection between Portugal and Brazil was virtually dissolved, the royal family abandoning Europe, and taking refuge in America. The rising in the Spanish possessions began soon after in Buenos Ayres, Venezuela, and Chili. Mexico revolted in 1810, and secured its independence in 1821. The other states followed at various intervals, Bolivia in 1824 being the last. In 1825 the surrender of the castle of San Juan de Ulloa removed the last vestige of Spanish dominion on the American continent. In 1867 Russia sold her possessions to the United States.

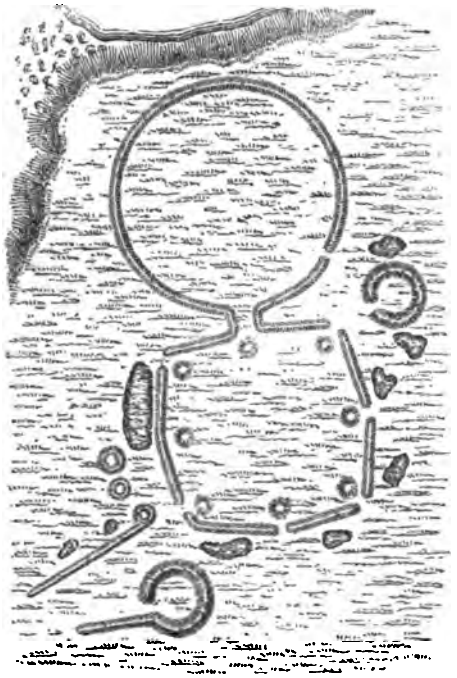
AMERICAN ANTIQUITIES. A large part of what are called the antiquities of America consist only of the architectural and other remains of the aboriginal tribes and nations, which were displaced or subjugated by European conquest and settlement. Such are many of the ruined temples and other edifices of Peru, Central America, and Mexico, as well as most of the ruder monuments of New Mexico, and probably all of those still ruder earthworks and rock sculptures which are found eastward of the Alleghanies. Cartier in Canada, and Smith in Virginia, as well as the pilgrims in New England and the French in western New York, all found the Indians constructing defences, consisting of ditches, embankments, and palisades, the remains of which are still numerous, and which have been variously ascribed to Celtic, Hebrew, and Tartar origins. So too Coronado, who marched into New Mexico as early as 1540, found there in perfect condition and actual use those singular edifices of fort-like dimensions and numerous stories, which since, abandoned and ruined, under the name of *casas grandes*, have been claimed as monuments of a supposed migration of the Aztecs from some undefined northern region, or from the frozen wastes of Kamtchatka, beyond the straits of Behring. Cortes in Mexico, Grijalva and Montejo in Yucatan, Alvarado in Guatemala, and Pizarro and his captains in Peru, all found vast and imposing structures, the work of the actual inhabitants, the ruins of which are almost universally confounded with those of more ancient monuments, the earlier works of the same hands or of unknown or extinct peoples. It is certain that Cholula, Uxmal, and Chichen, Quiché and Pachacamac, were all perfect and occupied at the time of the conquest. Hence their remains, however interesting and valuable as illustrating American aboriginal art, can hardly be considered as falling within the denomination of American antiquities. Under this head, in a strict sense, we can only include such monuments as were really regarded as antiquities by the aborigines themselves, concerning the origin of which they were wholly ignorant, or only possessed a traditionary knowledge. Of this character are most of the earthworks and mounds on the terraces of the Mississippi valley, and in the forests bordering on the Mexican gulf. Such also are the ruined pyramids of Teotihuacan and the crumbling edifices of Mitla, in Mexico; the still more elaborate structures and sculptured monoliths of Palenque and Copan; and the vast enigmatical monuments of Tiahuanaco on the southern shore of Lake Titicaca in Bolivia; to say nothing of the bewildering remains of Mansiche or Grand Chimu in northern Peru.—Commencing with our own country, we find

Casa Grande, New Mexico.



Fortified Hill, Butler County, Ohio.

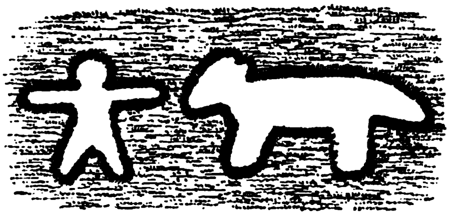
in the Mississippi valley a succession of earthworks, manifestly defensive in character, extending from the lakes southward to the gulf. They generally crown the summits of steep hills, and consist of an embankment and exterior ditch, of varying dimensions, with approaches often artfully covered. Fort Hill, on the banks of the Little Miami river in Ohio, has a line of circumvallation nearly four miles in extent, varying in height, according to the natural strength of the point protected, from 10 to 20 feet, and embracing an area of several hundred acres. When not erected near to streams, and in cases where springs are not included within their lines, we almost always find artificial reservoirs for holding water. A large class of these defensive works consist of a line of ditch and embankment, or of several lines one within another, carried across the necks of peninsulas or bluff headlands formed within the bends of streams. Associated with these defensive works, and often included within them, are structures connected with religious ideas and ceremonies. They consist of earthworks with their ditches, when such exist, interior and not exterior to the walls, of regular outline, squares, circles, octagons, and other geometrical figures, often combined, and sometimes of great extent; as for instance at Newark, Ohio, where they cover an area of more than two miles square, and probably comprise upward of 12 miles of embankment from 2 to 20 feet in height. (See "Monuments of the Mississippi Valley," by Squier and Davis, forming the first volume of the "Smithsonian Contributions to Knowledge.") Other works of a sacred or religious origin, consisting of mounds of earth and stone of various sizes, but always regular shapes, are found in connection with those above described, and are very numerous. They are oftenest square, terraced, and ascended by graded ways; sometimes hexagonal, octagonal, or truncated, and ascended by spiral paths, in most respects coinciding with the *teocallis* of Mexico and the *topes* of India—the high altars, symbolical in form, on which the priests offered up sacrifices, and paid adoration to the solar god. Some of these arrest our attention by their geometrical accuracy of form, and others by their great size, covering several acres of ground, and rising to imposing altitudes. A mound of this description, on the plain of Cahokia, Illinois, opposite the city of St. Louis, is 700 feet long by 500 feet broad at the base, and 90 feet high, covering upward of eight acres of ground, and having 20,000,000 cubic feet of contents. These mounds frequently contain skeletons. The most common monuments in the Mississippi valley, however, are those which are incontestably simple places of sepulture, memorials raised over the dead, and in their size probably bearing a certain relation to the importance when living of the personages over whom they were erected. Some of these, like that at Grave Creek near Wheeling in West Virginia, and that at Miamisburg in Ohio, the one 70 and the other 68 feet in vertical height, no doubt mark the graves of personages of high consequence among the builders of these monuments. It sometimes happens that one of these sepulchral mounds contains two or more skeletons, but they rarely cover more than one, except in cases where the later Indian tribes, with a vague notion of their sanctity, have buried their dead in them. The early white settlers also occasionally buried in them. The notion that



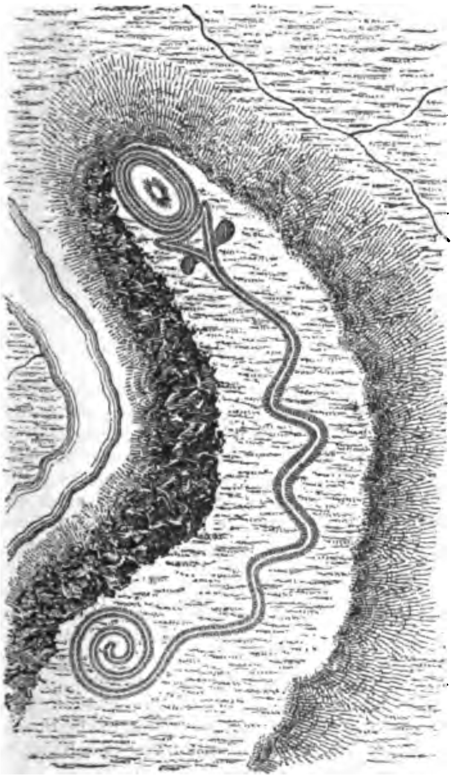
Ancient Works near Chillicothe, Ohio.

Conical Mound, Marietta, Ohio.

they contain vast heaps of slain, and are memorials of great battles, is unsupported by facts. Still more remarkable earthworks are those commonest in Wisconsin and Iowa, but of which a few examples are found in Ohio, and which bear the outlines of men and animals, constituting huge bass-reliefs on the surface of the earth. One of these, surveyed by Squier and Davis in 1846, on the banks of Brush creek, Adams county, Ohio, is in the form of a serpent, over 1,000 feet in length, extended in graceful curves, and terminating in a triple coil at the tail. The embankment constituting the effigy is upward of 5 feet high by 30 feet base at the centre of the body, diminishing somewhat toward the head and tail. The neck of the figure is stretched out and slightly curved, and its mouth is opened wide, as if in the act of swallowing or ejecting an oval figure, which rests partly between the distended jaws. This oval is formed by an embankment 4 feet high, and is perfectly regular in outline, its transverse and conjugate diameters being 103 and 39 feet respectively. The combined figure has been regarded by some as a representation of the oriental cosmological idea of the serpent and the egg. With the remains of the dead in the sepulchral mounds, as also within those which are believed to have been connected with the religion of their builders, many relics of art have been discovered, displaying greater skill than was known to exist among the tribes found in occupation of the country at the time of the discovery. Elaborate carvings in stone, pottery often of elegant design, articles of use and ornament in metal, silver, and native copper from Lake Superior, mica from the Alleghanies, shells from the gulf of Mexico, and obsidian, probably also porphyry, from Mexico, are found side by side in the same mound. Articles of comparatively recent date, some of them of undoubted European origin, have also been found among the later and secondary deposits in the mounds. Forged inscriptions, stones bearing mysterious characters, "Erse, ancient Greek, Phœnician, Celtiberic, and Runic," as evidences of every possible and impossible theory of American origin, have each found people credulous enough to accept and defend their authenticity, even after the authors of the various impostures have abandoned them to their fate. The facts connected with the monuments of the Mississippi valley "indicate that the ancient population was numerous and widely spread, as shown from the number and magnitude of their works, and the extensive range of their occurrence; that it was essentially homogeneous in customs, habits, religion, and government, as appears from the great uniformity which the works display, not only in respect to position and form, but in all minor particulars; and that the features common to all the remains identify them as appertaining to a single grand system, owing its origin to a family of men moving in the same general direction, acting under common impulses, and influenced by similar causes." Whatever differences the monuments display are such as might result from the progressive efforts of a people in a state of development, or from the weaker efforts of colonies, or what might be called provincial communities. It is impossible that a population for whose protection such extensive military works were necessary, and which was able to defend them, should not have been eminently agricultural; and such monuments as the mounds at Grave Creek and Cahokia indicate not only a dense agricultural population, but a state of society essentially different from that of the existing race of Indians north of the tropic. There is not, and there was not at the period of the discovery, a single



Animal-shaped Mounds, Wisconsin.



Serpent-shaped Mound, Adams County, Ohio.

tribe of Indians, north of the semi-civilized nations of Mexico and Central America, which had the means of subsistence to enable them to supply for such purposes the unproductive labor necessary for the work; nor were they in such a social state as to compel the labor of the people to be thus applied. As regards the antiquity of these monuments, apart from such facts as a total absence of any reasonable traditions as to their origin among the Indians themselves, and the existence of the largest and most ancient forest trees on the embankments and in the ditches of the various works, there are other facts which enable us to arrive at approximate conclusions upon this point. None of these works occur on the lowest formed of the river terraces which mark the subsidence of the western streams; and as there is no good reason why their builders should have avoided erecting them on that terrace, while they raised them promiscuously upon all the others, it seems to follow that this terrace has been formed since these works were erected; a conclusion supported by the important fact that some of them have been in part destroyed by streams which have since receded for half a mile and upward, and which under no present possible rise, from rains or other natural cause, could reach the works again. Upon these premises, the time since the streams have flowed in their present courses may be divided into four periods, corresponding to the four terraces which mark the eras of their subsidence, of which period the last and longest (since the excavating power of the streams diminishes as the square of their depth increases) has elapsed since the race of the mounds flourished. Another fact bearing upon the question of the age of these works is the extremely decayed condition of the human remains found in the mounds. Considering that the earth around the skeletons is for the most part wonderfully compact and dry, and that the conditions for their preservation are exceedingly favorable, while they are in fact in the last stage of decomposition, we may form some approximate estimate of their remote antiquity. In the barrows of the ancient Britons, in a moist climate and under unfavorable conditions as regards preservation, entire and well preserved skeletons are often found possessing an undoubted antiquity of at least 1,800 years. From these and other facts and circumstances equally conclusive, we may deduce an age for most of the monuments of the Mississippi valley of not less than 2,000 years. By whom built, and whether their authors migrated to remote lands under the combined attractions of a more fertile soil and more genial climate, or whether they disappeared beneath the victorious arms of an alien race, or were swept out of existence by some direful epidemic or universal famine, are questions probably beyond the power of human investigations to answer.—The principal remains of antiquity in Mexico are the ruins of temples and of structures dedicated to defensive purposes. Those of undoubtedly high antiquity are most massive in character, and display remarkable evidences of taste and skill. It would seem that during the aboriginal rule the bulk of the inhabitants dwelt in rude structures of thatch and cane, which after a few years of abandonment would decay and leave no trace of their existence, except perhaps in the fragments of broken pottery which might surround them. Whatever of architectural skill the people possessed was dedicated to the construction of their temples and the residences of their chiefs, which were often included the one within the other. These temples were in nearly all cases pyramidal in form, terraced and truncated, and ascended by flights of steps usually built on an inclined plane running up the centre of one of the sides, generally that opposed to the rising sun. These structures perhaps better deserved the name of altars, or the Scriptural name of "high places," than of temples; an edifice built on the level summit in reality constituting the *naos*, or temple proper. The great temple of Mexico, which is described by all the early writers as nearly identical in form and structure with all the temples of Anahuac, consisted of an immense square area, "surrounded by a wall of stone and lime eight feet thick, with battlements ornamented with many stone figures in the form of serpents." The extent of this enclosure, which occupied the centre of the ancient city, may be inferred from the assertion of Cortes that it might contain a town of 500 houses. It was paved with polished stones, so smooth, says Bernal Diaz, that "the horses of the Spaniards could not move over without slipping." The four walls of this enclosure corresponded with the cardinal points, and gateways opened midway upon each side, from which, according to Gomera, led off broad and elevated avenues or roads. In the centre of this grand area arose the great temple, an immense pyramidal structure of five stages, faced with stone, 300 feet square at the base and 120 feet high, truncated, with a level summit, upon which

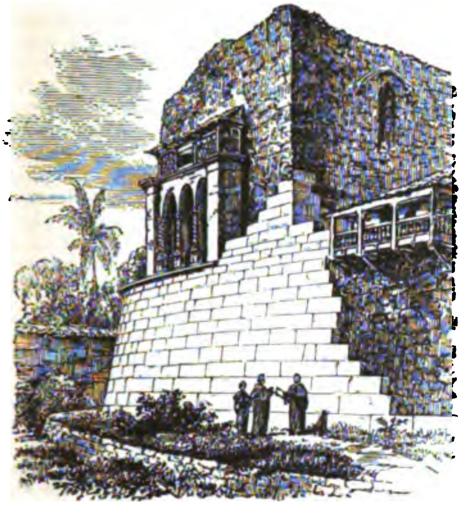
Mexican Teocalli.

were situated two towers, the shrines of the divinities to whom it was consecrated. It was here that the sacrifices were performed and the eternal fire was maintained. One of these shrines was dedicated to Tezcatlipoca, the other to Huitzlipochtli; which divinities sustained the same relation to each other in the Mexican mythology as Brahma and Siva in that of the Hindoos. Besides this great pyramid, according to Clavigero, there were 40 similar structures, of smaller size, consecrated to separate divinities; one was called Tezcacalli, which was covered with brilliant materials, and sacred to Tezcatlipoca, the god of light, the soul of the world, the vivifier, the spiritual sun; another to Tlaloc, the god of water, the fertilizer; another to Quetzalcoatl, said to have been the god of the air, whose shrine was distinguished by being circular, "even," says Gomera, "as the winds go round about the heavens; for that consideration made they his temple round." Besides these, there were the dwellings of the priests (amounting, according to Zarate, to 5,000) and of the attendants in the temples, seminaries for the instruction of youth, and, if we are to credit some accounts, houses of reception for strangers who came to visit the temple and see the grandeur of the court; also ponds and fountains, groves and gardens, in which flowers and "sweet-smelling herbs" were cultivated for use in certain sacred rites, and for the decoration of the altars. "And all this," says Solis, "without retracting so much from that vast square, but that 8,000 or 10,000 persons had sufficient room to dance in it, upon their solemn festivals." The area of this temple was consecrated ground; and it is related of Montezuma that he only ventured to introduce Cortes within its sacred limits after having consulted with the priests and received their permission, and then only on the condition, in the words of Solis, that the conquerors "should behave themselves with respect." The Spaniards having exhibited, in the estimation of Montezuma, a want of due reverence and ceremony, he hastily withdrew them from the temple, while he himself remained to ask the pardon of his gods for having permitted the impious intrusion. There is a general concurrence in the accounts of this great temple given by the early authorities, among whom are Cortes, Diaz, and others, who witnessed what they described. They all unite in presenting it as a type of the multitude of similar structures which existed in Anahuac. Their glowing descriptions, making due allowance for the circumstances under which they wrote, are clearly sustained by the imposing ruins of Papantla, Xoxachalco, Misantla, Quemada, and the thousand other monuments which are yet unrecorded by the antiquary. Solis speaks of eight temples in the city of Mexico of nearly equal grandeur with that above described, and estimates those of smaller size to amount to 2,000 in number, "dedicated to as many idols of different names, forms, and attributes." Torquemada estimates the number of temples in the Mexican empire at 40,000, and Clavigero places the number far higher. "The architecture," he adds, "of the great temples was for the most part the same with that of the great temple of Mexico; but there were many likewise of a different structure, composed of a single body in the form of a pyramid, with a staircase, &c." Gomera says, "They were almost all of the same form; so that what we shall say of the principal temple, will suffice to explain all the others." Cortes, in a letter to Charles V., states that he counted 400 of these pyramidal temples at Cholula. From all sources we gather that the principal temples, or rather sacred places, of Mexico consisted of large square areas, surrounded by walls, with passages midway at their sides, from which avenues or roads sometimes led off; and that within these enclosures were pyramidal structures of various sizes, dedicated to different divinities, as also the residences of the priests, with groves, walks, and fountains. It has already been said that the pyramids of Teotihuacan, which are found within eight leagues of the city of Mexico, on the plain of Otumba, are probably among the most ancient monuments of Mexico. There are two principal ones, dedicated, according to tradition, to the sun and moon respectively; each built of cut stone, square, with four stages and a level area at its summit. Humboldt says the larger is 150 feet and the smaller 145 feet high. Mr. Brantz Mayer, however, affirms that the larger is 171 feet high; Mr. Glennie, 221 feet. It is 680 feet square at the base, covering an area of 11 acres, or nearly equal to that of the great pyramid of Cheops in Egypt. The pyramid of Cholula also has four stages, and when measured by Humboldt was 160 feet high by 1,400 feet square at the base, covering an area of 45 acres.—The temples of Central America, of which so many ruins still exist, although possessing a general correspondence with those of Mexico, had nevertheless many features peculiar to themselves. The artificial terraces of pyramidal elevations seem to have been usually less in size, but crowned with more extensive buildings, upon which aboriginal art exhausted its utmost capabilities. These structures were marked by broad stairways, leading directly to their principal entrances. Upon some of these terraces a single building was erected, but upon the larger ones several (usually four) were arranged so as to form a court or area. They were massively built, the walls being in all cases of great thickness. The larger number were one story high; but there were many of two, and some of three or more stories. In these cases, each successive story was usually smaller than that below it, giving the structure the appearance of a pyramid of several stages. The fronts of these buildings, though sometimes stuccoed, were usually of stone, and covered with elaborately carved figures and ornaments, many of them without doubt symbolical. The interiors of some corresponded with the imposing character of their exteriors. They were divided into narrow corridors and dark chambers. These were arched, or rather the roofs were supported by overlapping courses of stones—constituting a pointed arch, corresponding in type to the earliest monuments of the old world. The walls of these corridors were often stuccoed, and covered with paintings and figures in bass-relief. Within some of the chambers, as at Palenque, have been discovered tablets clearly of a mythological character, covered with elaborate and artistic sculptures and hieroglyphics. In these chambers are still found the remains of idols and altars, and evidences of ancient sacrifices. The works of Stephens, Catherwood, Squier, Brasseur de Bourbourg, and Charney contain full accounts of these monuments.—In Honduras, at Copan, the remains of edifices are found, corresponding generally with the preceding description, but associated with grand monoliths, intricately carved, such as have been discovered nowhere else except at Quirigua, in the vicinity of Copan, and on the islands of Lake Nicaragua. They seem to have been planted in the areas, perhaps also on the steps and summits, of the ancient structures. Whether designed as statues of the gods of ancient worship, or to commemorate distinguished priests, warriors, or statesmen, can probably only be determined when the hieroglyphical inscriptions which some of them bear shall have been deciphered. To Copan we may safely assign an antiquity higher than to any of the other monuments of Central America with which we are acquainted, except those rude works of earth and uncut stone which also exist there, and which seem to have been the early types after which, as civilization and the arts advanced, the more imposing monuments of which we have spoken were modelled. It is certain that Copan was a ruin, concerning which only the vaguest traditions existed, at the period of the Spanish conquest.—In New Granada, among many minor relics of antiquity, such as figures of divinities and objects worked in gold and stone, are found a few considerable monuments, consisting of structures which seem to have been supported by columns of large size and just proportions.—In Peru we find a very large number of aboriginal monuments, consisting not alone of ruined temples, but of great works of public utility—aqueducts, bridges, and paved roads hundreds of miles in length. The remains of the great temple of the sun at Cuzco are still imposing. In describing it as it existed at the time of the conquest, the early Spaniards expended every superlative of their language. It consisted of a principal building and several chapels and inferior edifices, covering a large extent of ground, in the heart of the city. Aqueducts opened within this sacred enclosure; and it contained gardens, and walks among shrubs and flowers of gold and silver, made in imitation of the productions of nature. It was attended by 4,000 priests. "The ground," says La Vega, "for 200 paces around the temple, was considered holy, and no one was allowed to pass within this boundary but with naked feet." Nor even under these restrictions were any permitted to enter except of the blood of the incas, in whom were centred the priestly and civil functions of the government. Besides the great temple of the sun, there was a large number of inferior temples in Cuzco, estimated by Herrera at 300. Nu-

Pyramidal Temple, Palenque.

Monolith, Copan.

merous others are scattered over the empire, all of which seem to have corresponded very nearly in structure to that already described.



Remains of Temple of the Sun, Cuzco, Peru.

The one most celebrated, next to that of Cuzco, was that of Pachacamac, which contained a considerable town, the grand pyramidal shrine of the divinity Pachacamac, and, after the conquest of the coast by the incas, a temple of the sun and a convent of the vestals of the sun, the whole surrounded by a wall of several miles in extent. According to Roman, who speaks, however, with little authority, "the temples of Peru were built upon high grounds or the tops of hills, and were surrounded by four circular embankments of earth, one within the other. The temple stood in the centre of the enclosed area, and was quadrangular in form." A structure corresponding very nearly with this description is noticed by Humboldt, who denominates it, in accordance with local traditions, Ingapilca, "House of the Incas," and supposes it to have been a sort of fortified lodging place of the incas, in their journeys from one part of the empire to the other. It is situated at Cannar, and occupies the summit of a hill. The "citadel" is a very regular oval, the greatest axis of which is 125 feet, and consists of a wall, built of large blocks of stone, 16 feet high. Within this oval is a square edifice, containing but two rooms, which resembles the ordinary stone dwellings of the present day. Surrounding these is a much larger circular enclosure, which, from the description and plate, we infer is not far from 500 feet in diameter. This series of works possesses few military features, and it seems most likely that it was a temple of the sun. This opinion is confirmed by the fact that at the base of the hill of Cannar was formerly a famous shrine of the sun, consisting of the universal symbol of that luminary formed by nature upon the face of a great rock. Ulloa describes an ancient Peruvian temple, situated on a hill near the town of Cayambe, perfectly circular in form and open at the top. It was built of unburnt bricks, cemented together with clay. The most wonderful and probably among the most ancient monuments of Peru (or rather Bolivia, formerly Upper Peru) are those at Tiahuanaco, already referred to, on the shore of Lake Titicaca. Their origin is lost in obscurity, and they are supposed by many writers to have been the work of a race anterior to the incas, denoting perhaps a more advanced civilization than the monuments of Palenque. They have been described by a number of the early writers, commencing with Pedro de Ceiça, one of the followers of Pizarro, in whose day their ruins seem to have differed but slightly from what they are now. The latest and probably the most exact account of these enigmatical remains is that of Mr. Squier, who spent several weeks in their investigation in 1864. He describes them as situated in a broad, open, arid plain, cold in the wet and frigid in the dry season, where no cereals will ripen, the only production fit for human use being a variety of small bitter potato. The monuments consist of rows of erect stones, some of them rough or but rudely shaped by art; others accurately cut and fitted in walls of admirable workmanship; long sections of foundations with piers and portions of stairways; blocks of stones with mouldings, cornices, and niches cut with geometrical precision; vast masses of sandstone, trachyte, and basalt, but partially hewn; and great monolithic doorways, carved from single blocks of stone, and bearing symbolical ornaments in relief, besides smaller rectangular, and symmetrically shaped stones, rising on every hand or scattered in confusion over the plain. The central and most conspicuous portion of the ruins is a great rectangular mound of earth, 650 feet long, 450 wide, and now about 50 feet high. It was originally terraced, each terrace being faced by a massive wall of cut stones, artfully dovetailed and clamped together, and had on its summit various stone edifices. This mound, which is called "the fortress," has on its E. side an apron or dependent platform, 320 × 180 feet. A short distance to the N. of this mound is what is called "the temple," a rectangle of 445 by 388 feet, defined by lines of erect stones, some entirely rude, and others apparently partially shaped by art. They support a terreplein of earth, on which are traces of structures, and on the E. side of which are ten great stone pilasters, suggestive of Stonehenge, perfectly alligned, and of varying sizes; the largest being 14 feet high above ground, by 4 ft. 2 in. broad and 2 ft. 8 in. thick. Near "the temple" are the foundations of what is called "the palace," the piers which supported the walls being of hard trachyte admirably cut, in this respect equalling the finest stone work of ancient or modern times. Besides these there is an enclosure called "the hall of justice," rectangular, 420 by 370 feet, within which are the ruins of a nameless structure, "sanctum sanctorum," 131 by 23 feet, composed of massive stones beautifully cut, some of which are 25½ feet long by 14 broad, and 6 ft. 6 in. thick, held together by bronze clamps. A distinguishing and peculiar feature of the remains at Tiahuanaco are a number of monolithic doorways, the largest of which is 13 ft. 5 in. long by 7 ft. 2 in. high above ground, and 18 in. thick. Through its centre is cut a doorway 4 ft. 6 in. high above ground, and 2 ft. 9 in. wide, above which, on its S. E. front, are four lines of sculpture in low relief, and a central figure immediately over the doorway in high relief. On the reverse the doorway is surrounded by friezes or cornices, with ornamental niches, &c. Besides these remains there are innumerable others of massive proportions, covering fully a square mile, of which it would require many pages to give an intelligible description, even with the aid of cuts and plans. Mr. Squier is disposed to rank the great areas at Tiahuanaco, surrounded with upright stones, with those vast open temples like Stonehenge and Avebury in England, and of which examples are found in other parts of the world. Looking to the cold, barren region in which these remains occur, so ill adapted to the support of any considerable population, Mr. Squier fails to regard them as relics of an ancient capital or seat of dominion, but of a sacred spot or shrine, the position of which was determined by an augury, an incident, or a dream. Certain it is, they were ruins at the time the inca conquerors swept over the Collao. Mr. Squier was the first to make known the existence, in the great Andean plateau, of a class of rude lithic and megalithic monuments, generally regarded, throughout the world, as the earliest efforts of human art. These consist of circles, defined by uncut stones, which in Scandinavia, the British islands, France, and northern and central Asia, have been loosely designated as "sun" or "Druidical" circles; also of piles of rough stones coincident in style and character with the cromlechs, dolmens, &c., of the same regions. On the bare mountain tops of High Peru are hundreds and thousands of enclosures or fortresses, *pucuras*, antedating all history, which were built, according to Peruvian tradition, when the country was divided up into warlike and savage tribes, "before the sun shone," or the incas had established their beneficent rule. They strongly resemble the remains which in Europe are uncritically known as Pelasgic. They are held in great reverence, as the works of giants whose spirits still haunt them, and to whom offerings of various kinds are still made. The symbolic character of the stone circles may be inferred from the name they still bear, *intihuatani*, places where the sun is arrested or tied up. There is another class of monuments also antedating the incas, the *chulpas* or burial towers, presumably of the ancient Aymaras. Some of these are round, others square, of varying proportions, from 15 to 40 feet high; sometimes constructed of elaborately cut stones, in other cases of high stones stuccoed over, and all containing inner chambers in which the dead were deposited, generally in niches in the walls, or in cists beneath the foundations. The remains of inca art are numerous and imposing. A considerable portion of the gorgeous temple of the sun in Cuzco is still extant; the great cyclopean fortress of Sacsahuaman that dominates the city of the sun, and in storming which Juan Pizarro lost his life, is almost as perfect as it was three centuries ago; the mountain stronghold of Pisac challenges our admiration by the rare engineering skill it displays, as well as by its massiveness and extent, covering as it does miles of area; Ollantitambo, wrought in polished porphyry, is a marvel of aboriginal art; while the palace of the vestal virgins on the island of Coati in Lake Titicaca, the terraced mountains, the vast *acequias*, and the paved roads thousands of miles long, all attest the power and beneficence of the incas. The Peruvian empire was a concretion of families, tribes, or nationalities, reduced by conquest, and their monuments, especially on the Pacific coast, as Europeans found them, have few resemblances and no identities with those of the elevated interior whence the inca race descended. Among the most important of the coast nations were the Chimus, who held wide sway, with their capital, at what is now called Grand Chimu, or Mansiche, near the town of Truxillo, founded by Cortes, in what is known as northern Peru. They were subjugated by the incas at a period not easily definable, after a long and bloody struggle, and their capital given up to barbaric ravage and spoliation. But its remains exist to-day, the marvel in many respects of the southern continent, covering not less than 20 square miles. Tombs, temples, and palaces arise on every hand, ruined but still traceable. Immense *huacas* or pyramidal structures, some of them half a mile in circuit; vast areas shut in by massive walls, each containing its water tank, its shops, municipal edifices, and the dwellings of its inhabitants, and each a branch of a larger organization; prisons, furnaces for smelting metals, and almost every concomitant of civilization, existed in the ancient Chimu capital. One of the great *huacas*, or pyramidal edifices, called "the temple of the sun," is 812 feet long by 470 wide at the base, and about 150 feet high. Another, "El Obispo," is nearly equal in size. These vast structures have been ruined for centuries; but the work of their excavation is still going on. From one of them, called that of Toledo, a Spanish explorer of that name in 1577 took $4,450,284 in gold and silver.—As already observed, most of the monuments of antiquity in America seem to be the ruins of temples, places of worship, or edifices in some way connected with the religion and superstitions of their builders. Throughout they sustain many and obvious resemblances, consisting of elevated platforms or truncated pyramids, ascended directly by broad flights of steps, or circuitously by winding paths; they scarcely differ except in the materials of which they are constructed, or the greater labor and skill displayed upon them. The builders of the temple mounds of the Mississippi valley seem to have been governed by the same principles which controlled the architects of the majestic *teocallis* of Mexico; their ruder structures being only the evidences of their ruder or earlier state. Instead of being faced with stone, elaborately carved with the symbols of their religion, the green turf covered the high places of the mound-builders; they ascended them by graded avenues or winding paths, not by broad and imposing stairways; and the wooden temple roofed with bark supplied the place of the massive edifices which still rear their crumbling, spectral fronts amid the forests of Central America. The features of resemblance between a large part of the monuments of America and many of the most ancient of those of the old world early attracted the attention of Humboldt, who seems to have been strongly impressed with their indentity, yet, with characteristic caution, unwilling to follow the connections to their ultimate results. That the practice of erecting these colossal, montiform temples was necessarily derivative, cannot be admitted. The primitive temples of every people on the globe seem to have been constructed much upon the same plan, and consisted of great enclosures of earth or upright stones, often, if not always, symbolizing in their forms the leading conceptions connected with the worship to which they were dedicated. The primitive altars, or shrines of the heathen gods, corresponded in rudeness and size with their vast open temples, and like them sustained everywhere a general resemblance. This resemblance to a certain degree may be regarded as accidental, inasmuch as an eminence or high place would naturally suggest itself as the most fitting spot whereon to render up homage to those superior powers which were supposed to dwell above, in the skies, or among the stars. It may also have resulted in no small degree from the very general primitive superstition that mountains and hills were the abiding places of the gods.

AMERICAN INDIANS. When America was discovered by Columbus, it was supposed by him and his contemporaries to be a part of the region vaguely termed India beyond the Ganges; and the newly discovered lands were thenceforth styled Indies, and the native inhabitants to this day are called Indians. The names by which Indian tribes are known to us are a strange medley. Some are nicknames given by the whites, such as Hurons, Iroquois, Nez Percés, Gros Ventres, Diggers, Blackfeet, Flatheads; others are derived from some locality near which they resided, as the Delawares, River Indians, Montagnais, Athabascans, &c. A great many tribes are known to us by the names applied to them by other Indian tribes. Thus the words Mohawk, Sioux, Esquimaux, Assiniboins, Arkansas, and Nottoway are not the real names of tribes, but all Algonquin terms; so too Adirondacks is the Mohawk term of contempt for the Montagnais on the St. Lawrence. As a general rule Indians when asked their name give the term Men or Real Men. This is the meaning of Onkwe Honwe, used by the Hurons and Iroquois; Renappi, Lenni, Illiniwek, Irini, Nethowuck, used by Algonquin tribes; Tinne, used by the Athabascans; and apparently of Apache. But this meant the tribe as composed of individuals: each tribe as a unit, a body politic, had a name, generally that of the animal or object which was the totem of the tribe. Thus the five Iroquois nations were called as one Hotinnonsionni or Hodenosaunee, a cabin; the Mohawk was the Ganniagwari, the she bear; the Illinois were called Anoka.—The whole continent was occupied by scattered tribes, from the lowest stage of barbarism to a semi-civilized state, corresponding to the stone and bronze ages of the old world, for iron was nowhere wrought. Agriculture was confined to a few plants—maize, squashes, beans, tobacco, plantains, cassava, &c. Manufactures were confined to the making of canoes from bark or hollowed trees, lodges of bark or skins, garments of skins, and in some parts basket work and rude weaving, weapons, and images carved and occasionally hammered or moulded. There seems to be an identity of race throughout the continent. Lawrence gives their general character as follows: skin brown or cinnamon-hued; iris dark; hair long, black, and straight; beard scanty; eyes deep-seated; nose broad, but prominent; lips full and rounded; and face broad across the cheeks, which are prominent, but less angular than in the Mongolian, and with the features distinct. The general shape of the head is square, with low but broad forehead, back of head flattened, top elevated, face much developed, and powerful jaws. The parietal region is much developed, the orbits are large, the feet and hands small and well proportioned, and the teeth white and sound; the facial angle about 75°. The average stature is no greater than in other races. The muscular development is not great, and there is a tendency to grow very fat when food is abundant and the habits of life are lazy. Though active and agile in sports and pursuits of short duration, the Indian is inferior to the white race in labors requiring compactness of muscle and long-continued exertion. The complexion varies from the dark brown of the California tribes to the almost white of the Mandans and the Chinooks. The beard is scanty, except among the Athabascans, and is prevented from appearing by the custom of plucking it out. The Indian has a dull, sleepy, half-closed eye, with little fire, unless when the passions are excited. The features are frequently regular, and the expression noble; many of the women are handsome. The skin is thinner, softer, and smoother than in the white races. The practice of artificially moulding the skull was often adopted. The average volume of the brain, as measured in nearly 650 crania, is only 77 cubic inches for the semi-civilized and 84 for the barbarous tribes. Dr. Morton, from a scientific examination of skulls from existing tribes and ancient tombs, considers the American nations, excepting the polar tribes, as of one species and one race, but of two great families, which resemble each other in physical but differ in intellectual character. The North American Indian was of haughty demeanor, taciturn, and stoical to the last degree; cunning and watchful in the surprise, persevering in the pursuit, and revengeful in the destruction of his enemies; cruel to prisoners of war, without regard to age or sex, and when himself a captive enduring the most painful tortures without a murmur; brave and too often ferocious in war; idle and grave in peace, except when engaged in hunting and amusements; hospitable, and grateful for favors; of necessity a close observer of natural phenomena, his temperament poetic and imaginative, and his simple eloquence of great dignity and beauty of expression. As a race, however, the animal propensities strongly preponderate over the intellectual.—The origin of the American Indians has been a matter of debate for centuries, and Grotius, De Laet, Garcia, and others discussed it in their day with more learning than judgment. During the last century and early in this a number of writers, treating many early usages of mankind as peculiarly Jewish, endeavored to prove the Indians to be descended from the ten tribes. Others, with as little foundation in facts, endeavored to derive them from the Welsh, the Mongols, or Malays. The tribes of North America regarded themselves as comparatively recent occupants of the soil. The Algonquins and Iroquois had traditions of their journey eastward: the Algonquins styled the Dakotas men of the salt water, and, being pressed eastward by them, repelled their advance. The Athabascans kept up the remembrance of their emigration across the Pacific; the Choctaws came from the northwest, and the Mexicans are generally supposed to have come from the north, though the latest theories assign to them a southern origin. All this pointed to the northwest, where the abundance of fish made a natural halting spot for tribes till they were driven south by a new emigration. The Huastecas seem the first moving northward. While language fails to connect them with any Asiatic families, their modes of life and implements are thought to connect them with all the earlier races of the eastern continent whose relics are found in mounds and shell heaps.—The most civilized parts when discovered by Europeans were those extending from New Mexico to Peru. There permanent architecture prevailed, the work of the occupants or of a previous race, the finest specimens being in the Maya region and in Peru, and the least enduring the adobe buildings of the Gila and Rio del Norte. Out of the limits of this district nothing but the most perishable structures were raised, the only monuments being mounds, often peculiar and apparently symbolical in shape. The inhabitants were divided into a number of tribes, whose natural state seemed to be that of war. The Esquimaux in the north were warmly clad in furs, and lived in close huts of snow or dug into the earth. The sea furnishing their subsistence, they invented peculiar boats, spears, and means for kindling and preserving fire. Below them, the wild tribes covering most of British America and the United States were hunters and fishers, giving little attention to agriculture, except among the Huron Iroquois, who raised maize, beans, squashes, and tobacco, and seem to have been the earliest who carried on any trade. In point of manufactures they were about equally advanced. All made pottery. The Iroquois bark lodges were superior to the tent-like hide huts of the Algonquins, but the latter excelled in the manufacture of the ingenious snow shoes and in canoe building, the Iroquois using elm bark, the Algonquins birch. The Dakotas excelled in the manufacture of stone pipes, and the Pacific tribes in that of baskets, some so closely woven as to hold water. The Rocky mountains furnished a sheep whose wool several tribes learned to spin and weave. In point of progress the Cherokee and Choctaw Muscogees resembled the northern tribes. The Natchez were the first tribe going south who seem to have had anything like a temple for worship. The Pueblo Indians of New Mexico had towns, built with a dead wall without for protection, rising several stories, and entered by ladders. They had also temples, and cultivated the soil. The Mexican and Peruvian tribes were still further advanced; their range of manufactures and cultivated plants was greater; their means of perpetuating the memory of events better. At the north the rudest hieroglyphics formed the only means, the Micmacs in Nova Scotia having the most distinct system, and the only one which Europeans were able to adopt and employ; but the Mexicans had a system of picture writing of which enough has been preserved and explained to give us an insight into their history. The Peruvians at first had a system of recording by *quipos* or knotted cords, which, like the wampum belts of the north, seem to have been merely aids to the memory. The uncivilized tribes of South America, embracing the large families of the Caribs on the north, the Tupi-Guaranis on the east, and the Araucanians on the south and west, closely resembled in their state of advancement the wild tribes of the northern portion of the continent.—None of these tribes seem to have domesticated any animal except the dog, and among the Peruvians the llama. In no part consequently were there tribes leading a pastoral life, depending on their flocks and herds. Game was taken by shooting with the bow and arrow, or by means of darts or spears; smaller animals were taken by traps. Where game was very abundant, it was sometimes driven into a sort of park and slaughtered. The South American Indians used a blowpipe for small game, and the southern tribes used the lasso and stone balls attached to hide ropes. Fish was taken by nets or speared, and in some parts the fish in lakes were captured by throwing into the water vegetable matter that caused a kind of intoxication. The only beverage of the northern tribes was water, but the Mobilian tribes had their black drink, or *cassine*. In Mexico *pulque*, the fermented sap of the metl or maguey, furnished an intoxicating drink; and in South America a similar drink was the *cauim*, made from the cashew and other fruits subjected to fermentation. All tribes were fond of painting and tattooing their persons, the paint being varied for grief or joy, war or peace. They used as adornments beads made of clam shells, feathers, porcupine quills, and parts of birds and animals. The dress of the hunter tribes was simple, consisting of a robe and breech cloth for the men and a short petticoat for the women; in the warmer parts this petticoat was often a mere fringe of moss or other vegetable matter, and men went entirely naked. The use of tobacco, generally mixed with willow (hence *kinnikinnick*, a mixture), was almost universal among the Indian tribes, and has spread over the world. It was introduced at all their important assemblies, and the Mississippi tribes made the pipe the symbol of peace, a usage which spread to other parts of the country. The word *calumet*, a French Canadian corruption of *chalumeau*, has been adopted to designate this national pipe. In Peru the leaves of the coca chewed with quicklime, just as the East Indians chew the areca nut and betel palm, produced the same narcotic and stimulating effects. The amusements of the Indians were the athletic exercises, running, leaping, paddling, games of ball, games with small stones, some quite complicated, and dances. These last were numerous, and entered into religious observances and preparations for war, as well as merrymakings. The sexes generally danced apart. Boys were trained from the time they left the cradle to feats requiring dexterity and courage. The probation of the young warrior was attended in some tribes with long fasts and rigorous tortures; and he acquired a name and a recognized position in the tribe only on his return from his first expedition or battle. War was carried on rather by treachery and surprise, and by small bands, than by set battles or large armies. Those who fell were in the north scalped, the hair of the head with the skin being torn off as once practised in the eastern continent. Prisoners were either adopted and naturalized or tortured. Government was of the slightest kind. Kings and hereditary chiefs were found in some tribes; ability in others raised a man to command. Laws there were none, or courts, or judicial sentences, except among the more civilized in Mexico and Peru. The manner of making fire in different parts varied, from rubbing two pieces of wood or cane to ingenious machinery by which a revolving stake finally gave a blaze. The tribes believed in a future state of existence, and paid great attention to the bodies of the dead, in some cases collecting their remains after a certain number of years and burying them with choice objects in fur-lined trenches, with games and celebrations. Food was placed on the graves of the dead, and implements of the chase for use in the next world. They recognized a supreme being, and a host of spirits good and evil, the latter especially to be propitiated. The idea of sacrifice was apparently universal, and animals and human beings were offered, the former as substitutes for the latter. Cannibalism, except where impelled by necessity, was apparently connected with religious ideas. Being firm believers in the power of evil spirits, they ascribed disease and defeat to their malign influence; and the medicine men, who were supposed to counteract these, were resorted to in sickness, and when starting on the war path, the hunt, or long and perilous journeys by land or water. Dreams exercised a great influence over them, and may be considered a part of their religious system. They regarded them as manifestations of cravings of the soul, the non-gratification of which would be attended with serious injury to the whole man. Tribes were divided into clans, and as a rule no man could marry in his own clan, and the children followed the clan of the mother. The scheme of relationship was curious and complex. Woman was in a degraded state. She did all the work except war and hunting. She tilled the earth, and bore all burdens. Parturition was attended with little pain. Cooking was simple, and without seasoning. Baking was done in holes in the ground, and water was boiled by throwing heated stones into it. The common plan was to roast over the fire. Corn was parched, and was the food used while travelling, being often hidden in holes marked so as to be recognized. Some diseases introduced by the whites, such as smallpox, and alcoholic drink, have been singularly destructive and fatal. Disease was left to charlatans and superstitious treatment. The use of vapor baths was perhaps the most general and effective remedy. They employed as emetics thoroughwort, spurge, and Indian hemp; and as cathartics also the inner bark of the horse chestnut and butternut; as rubefacients, mayweed and waterpepper. They were acquainted with many poisons, which they used for self-destruction, the purposes of revenge, and in the more southern parts for poisoning their weapons. Blood-letting and cupping were not unknown. In asthma they smoked tobacco and drank infusions of spicewood, sassafras, and skunk cabbage; in coughs, slippery elm and mallow tea, and decoctions of the twigs of the pine and spruce; in renal affections, bearberry, spicewood, and gooseberry root; in diarrhœas of all kinds, decoctions of the low blackberry, cranesbill, hardhack, white oak bark, partridge berry, and American ipecacuanha or Indian physic (*gillenia*); in dropsy, the bark of the prickly ash and wild gooseberry, and externally a sweat in heated earth; in amenorrhœa, sassafras, spice, and wormwood decoctions; in hæmorrhage, powdered puff balls, and astringents firmly bound on the wound. Incised wounds they sewed together with strings from the inner bark of basswood or fibres from the tendons of deer; diseases of the skin were treated with yellow dock, and abscesses by poultices of onions.—In their intercourse with the Indians the Spanish government educated the sons of princes and chiefs and gave them rank as Spanish nobles, so that to this day distinguished families boast their descent from Mexican and Peruvian monarchs; and among those who governed Mexico as viceroys under the kings of Spain several bore the name of Montezuma. The lower orders of Indians were assimilated with those of the Spanish emigrants, and at an early period were admitted to the same civil rights. The wilder tribes were gradually formed to civilization by missionaries under the system of reductions, a presidio of soldiers being assigned to each. The children of the first converts soon mingled with the more civilized Indians. The consequence is that the great mass of the people of Spanish America are of Indian origin, some towns being almost exclusively so; and it would be almost impossible from our present data to give the exact Indian, white, and mixed population. The late president of Mexico, Juarez, was a pure Indian; and so have been many of the presidents of Central America. The number of wild tribes is consequently much less in proportion to the whole Indian population in Spanish America than in the United States. Of the missions on the plan of reductions the most famous were those of Paraguay.—The French, settling in Canada and subsequently Louisiana, had less civilized tribes to deal with; but they acquired a permanent ascendancy over them without wars. The Iroquois, occupying the present state of New York, were the great enemies of the French and their allies. French missionaries, however, repeatedly established missions even among the Iroquois, and the descendants of their converts form three towns in Canada. Missions begun at the commencement of the French settlements among the Nasquapees, Montagnais, Algonquins, Chippewas, and Ottawas are still maintained among the surviving remnants of those tribes. New missions under Catholic and Protestant direction have been established among the Crees, who had been incidentally reached by the old missionaries, and the Athabascan tribes and those in British Columbia and Oregon. The efforts of the French government to elevate the social condition of the Indians were unremitting; provision was made for their naturalization as citizens; but these efforts failed, although often renewed, and the most experienced gave up the task as hopeless. Their intestine wars were arrested, agriculture was introduced or improved slightly, and morality raised to a higher standard, so that they resemble the lower grade of peasantry, simple, indolent, and unambitious. Though some chiefs bore French commissions, and the convents educated some girls who became capable teachers and even entered religious orders as nuns, there is no example of men attaining admission to any civil profession. The diminution of game, destroyed for furs, and the influence of intoxicating liquors have steadily diminished the numbers of the Indians in the British possessions.—The English who colonized the present United States were not, like the colonists from Spain and France, under a system devised and maintained by the home government. There was no Indian policy, and between the English settlers and the natives there was a strong degree of incompatibility. From the moment the settlers were able to dispense with Indian aid in supplying Indian corn and game in return for trinkets or arms, down to the present day, the prevailing instinct of the Anglo-Saxon in America seems to have been to remove the Indian as far as possible from him. In the early times this influenced the austere religious Puritan of New England as much as it did the careless settler of Virginia. New England missions were early begun by the Mayhews on Martha's Vineyard and Nantucket, Eliot among the Naticks at Newton, Mass., Cotton and others at Plymouth, and Sergeant and his fellow laborers in Connecticut. But these efforts were almost entirely individual, and they have left us monuments of their zeal and ability in Eliot's Indian Bible and other works prepared for the converts. The most extensive efforts to Christianize the natives of what is now the United States were those starting from the French and Spanish colonies. The settlement of Florida was followed by permanent and beneficial missions among the Timuquas and Appalaches, which lasted till they were almost exterminated by the people of Carolina. Texas, New Mexico, and California were also seats of very extended missions, under which the Indians were instructed, preserved from evil influences, and made self-supporting. The Mexican revolution overthrew the system, and the whole structure was destroyed in a few years. The Pueblo Indians of New Mexico alone remain, much degenerated from their condition of a century ago. The French missions within our territory embraced those among the Abenakis of Maine, now represented by the Catholic

Penobscots and Passamaquoddies; among the Iroquois of New York, their converts finally removing to Canada and now found at Sault St. Louis, St. Regis, and Lake of the Two Mountains; among the Chippewas, Ottawas, Pottawattamies, Menomonees, Illinois (Kaskaskias, &c.), and Miamis (Weas, &c.). Those in Louisiana, among the Tonicas, Natchez, Choctaws, and Arkansas, seem to have produced little permanent good, except perhaps among the last. Maryland began missions coeval with its settlement, but the overthrow of the original plan of colonization put an end to them. About the beginning of the last century the English society for the propagation of the gospel in foreign parts began a new era. Missions arose among the Mohawks and in Virginia and Carolina. Dr. Wheelock's Indian school (afterward Dartmouth college) contributed to the work. The Brainerds labored in New Jersey and Pennsylvania. The efforts of the Moravians had still better results, and their Delaware mission was the most successful yet seen in the English colonies. During the present century far more has been done. The society of Friends took an active interest in Indian progress. The Episcopalians established an Oneida mission; the American board of commissioners for foreign missions, organized in 1810, established missions among the Cherokees, Choctaws, Ottawas, Chippewas, Chickasaws, Creeks, Dakotas, Pawnees, and Senecas, some of which were remarkably successful. Baptist missions were also established among several of these tribes. A Methodist society established in 1819 also founded Wyandot, Iroquois, Creek, Ottawa, Shawnee, Dakota, and Oregon missions; while the southern Methodists also created missions. The Presbyterians in 1837 began to labor among the Weas and other northwestern tribes, and among some of those in the Indian territory. The American missionary association, American Indian missionary association, southern Baptists, and Baptist home missionary society also entered the field. Their labors were not always permanent or well concerted, and frequent changes took place. Catholic missions arose among the Chippewas and Ottawas, under Bishop Baraga and others, among the Winnebagoes, the Pottawattamies and Osages, and in the Rocky mountains.—The French were able to maintain peace with all the Canadian tribes, while the English colonies were constantly at war. The first war between the English colonists and the natives occurred in Virginia in 1622, when the Indians under Opechanganough rose against the settlers to exterminate them. The colonists in a ten years' war reduced them at this time, and again in 1644; and in another war in 1675 they still more diminished the Indians. The New England wars began in 1637 with the destruction of the Pequods by the settlers of Connecticut and Massachusetts as allies of the Narragansetts, and the extermination of the Narragansetts in 1643 by the New Englanders as allies of the Mohegans. In 1675 began the war with Philip, chief of the Wampanoags, in which nearly all the Indians were cut off or driven to a distance. Maryland enjoyed comparative peace, but was in 1675 with Virginia involved in a war with the Susquehannas. The Dutch at New Amsterdam at first maintained friendly relations with the Indians, but in 1643 became involved in wars in which the Indians lost severely. In the south, North Carolina in 1711 suffered terribly in a war with the Tuscaroras, who finally emigrated to New York; and South Carolina in 1715 was attacked by the Yemassees and a confederation of tribes on its frontier. The New England occupancy of Maine brought on new hostilities connected with the wars between France and England. The French in Canada proposed neutrality and an agreement to employ no Indians on either side. New York consented and was saved from the horrors of Indian war, which New England preferred. The New England forces, however, finally overthrew the Pennacooks and Norridgewocks and closed their Indian war. In the seven years' war, known in America as the French and Indian war, both sides used the Indians, and the annals of the time teem with horrors. The French had some wars with the Foxes and Miamis in the west, and, provoking the Natchez, drew on themselves a massacre, followed by a war in which the Natchez were destroyed. The French then attacked the Chickasaws, but failed to subdue them. The Indians looked on the English success in Canada with jealousy, and Pontiac in 1763 organized a vast conspiracy of the Indian tribes, aiming at a total extirpation of the whites; but they were finally reduced, as were the Cherokees, who made war in 1760. In the course of these wars, Michilimackinac, and Forts St. Joseph, Ouiatenon, Miami, Presqu'isle, Lebœuf, and Venango, were taken by the Indians, Detroit besieged, and stubborn battles fought at Bloody Bridge, Fort Pitt, Bushy Run, and at Point Pleasant between the Virginians and Shawnees. When the American revolution began, the English government at once employed Indians, and the Iroquois and western tribes ravaged the frontiers. An expedition under Sullivan laid waste the territory of the Six Nations. The articles of confederation gave congress little power. Under the constitution of 1787 the general government claimed sovereignty over the whole territory, and had the management of Indian tribes not within a state and under laws and treaties with it. The United States treaties with Indians were made as with foreign powers. The great object to be obtained was the cession of the large tracts claimed as hunting grounds, sometimes on very slight pretexts. The Indian tribes viewed the new government with distrust, and the Miamis began hostilities in 1790, and in two engagements near the present Fort Wayne defeated the army under Gen. Harmar.

The next year they routed St. Clair's army, killing nearly half of his men; but they were reduced by Gen. Wayne in 1793. The war was renewed in 1811, when they were again defeated by Gen. Harrison at Tippecanoe. In the war with England that followed, the Indians aided the enemy and again ravaged the frontiers; but Harrison defeated the combined forces on the Thames in 1813, killing Tecumseh, the head of the great Indian confederacy; while in the south Jackson, in 1813 and 1814, humbled the Creeks at Tallushatchee, Talladega, and Tohopeka. In 1817 the Seminoles commenced hostilities, but were punished by Jackson, and Florida soon after became part of the United States territory. The next Indian trouble was that caused by the attempt of Georgia to dispossess the Creeks and Cherokees, who, relying on the treaties made with the United States, appealed in vain to congress and the supreme court. Failing to obtain redress, they yielded and agreed to remove beyond the Mississippi in pursuance of a plan for collecting all the Indians in one territory, to be theirs inviolably and for ever. Though treaties were signed in 1825, the removal was not completed till 1838. The Seminoles under Micanopy and Osceola refused to emigrate, and a war ensued in 1835 which lasted till 1842, and cost over $15,000,000. The Sacs and Foxes under Black Hawk gave trouble in 1832. Greater trouble was given by the Sioux or Dakotas, who from time to time attacked frontier settlements and had to be reduced. The Comanches and Apaches have been almost constantly committing depredations, often joined by other tribes. The Oregon tribes have several times been at war with the whites. The establishment of the Indian territory in 1833, the removal of the Choctaws and Creeks, and the settlement of the Quapaws and other tribes there, were followed by the formation of other reservations, under state management in New York, and under the general government in Michigan, Wisconsin, Minnesota, Kansas, Nebraska, Wyoming, Montana, Idaho, Dakota, Colorado, New Mexico, Utah, Nevada, Arizona, California, Oregon, and Washington territory. The civil war was ruinous to the tribes in the Indian territory. Geographically in the south, the confederate government took possession of it, and was supported by many of the chiefs. Others attempted to take part with the United States government. The result was disastrous in loss of life and property. In 1869 a board of Indian commissioners was created to superintend the disbursement of appropriations, and inspect goods furnished to the Indians. The powers of this body have been from time to time increased, but some new measures were adopted which have not yet been tested by time, such as that of assigning certain districts exclusively to certain missionary bodies, and the consequent confounding of the duties of Indian agent and missionary. The following is the return of the Indian population on reservations in 1871:

Sioux in Nebraska, Montana, and Dakota	42,998
Choctaws, Indian territory	15,000
Cherokees, Indian territory	14,682
Gros Ventres, Assiniboins, Cheyennes, and Arapahoes, in Montana	13,990
Creeks, Indian territory	13,000
Utes in Nevada, Utah, and Colorado	12,720
Chippewas in Kansas, Minnesota, and Wisconsin	11,036
Chippewas and Ottawas in Michigan and Indian territory	8,706
Navajos in New Mexico	8,234
Pueblos in New Mexico	7,683
Shoshonees and Bannocks in Wyoming, Idaho, and Oregon	7,687
California tribes	7,023
Six Nations, Iroquois, in New York, &c.	6,406
Kiowas, Comanches, and Apaches	5,372
Oregon tribes	5,866
Crows in Montana	5,100
Chickasaws in Indian territory	5,000
Pimas, Maricopas, Papagos, and Cocopas, in Arizona	4,031
Apaches in New Mexico	3,479
Arapahoes and Cheyennes in Indian territory	3,390
Dwamish, &c., in Washington territory	3,363
Osages in Indian territory	3,375
Colville, Spokanes, Okanagans, Washington territory	3,349
Nez Percés in Idaho	2,807
Yakamas in Washington territory	2,700
Pawnees in Nebraska	2,364
Seminoles in Indian territory	2,300
Pend d'Oreilles, Flatheads, and Kootenays, in Montana	1,900
Pottawattamies, in Indian territory and Kansas	1,786
Blackfeet, including Bloods and Piegans	1,500
Menomonees in Wisconsin	1,348
Nesqually, &c., in Washington territory	1,289
Wichitas, Caddoes, &c., in Indian territory	1,216
Omahas, Nebraska	984
Chehalis, Washington territory	900
Sklallams, Washington territory	825
Sacs and Foxes with Iowas	763
Mohaves, Arizona	725
Kansas, in Kansas	627
Makah, Washington territory	550
Otoes and Missourians in Nebraska	450
Spokanes and Cœurs d'Alène, in Idaho	300
Kickapoos, Kansas	296
Illinois and Miamis, Indian territory	251
Quapaws, Indian territory	225
Stockbridges and Munsees, Wisconsin	220
Wyandots, Indian territory	169
Shawnees	73
Total	237,478

Besides the Indians thus on reservations, there are 60,000 in Alaska, and tribes not yet brought in, as the Apaches, Comanches, Lipans, and Kickapoos, with a few remnants of tribes in Maine, Georgia, &c. (2,000), and Florida (500), estimated at 53,000 more, making the total Indian population of the Union about 350,000, according to the estimate of the Indian department in 1871.—That the red race is steadily diminishing can scarcely be doubted. In 1829 the entire Indian population of the United States was estimated at 313,000; and though the annexation of Texas, New Mexico, and California brought in a large addition, the estimate of 400,000 made in 1850 was evidently too large. In 1855 Mr. Schoolcraft's estimate, with all the data of the Indian department, was 350,000. In 1871 the commissioner estimated them, including 60,000 in Alaska, as still 350,000, showing an actual decrease of 60,000 in 16 years. Yet some of the civilized tribes have held their own. The Cherokees in 1822 numbered 11,000; 1825, 15,000; 1871, 14,682. The Chippewas and Ottawas in 1822 were 18,977; 1825, 18,850; 1871, 19,782. The Iroquois in 1822, 4,000; 1825, 4,510; 1871, 4,958. The Chickasaws in 1822, 3,625; 1871, 5,000. The Creeks and Choctaws in that period lost about one third, the Seminoles one half, the Sacs and Foxes seven eighths.—In the eye of the law the Indian originally held an anomalous position, neither citizen nor alien, and incapable of becoming a citizen. In some parts marriage between Indians and whites was severely punished. The disabilities have recently been removed, and Indians are enabled to leave their tribes or renounce the tribal system as a body and become citizens. Col. Ely S. Parker, a Seneca Indian, has even held the office of Indian commissioner. This step enables the more intelligent and industrious Indians to identify themselves with the white population, and induce others by their example to follow the same course. The Indian population of the British colonies is estimated at 150,000. That in Mexico and Central America is not easily ascertained, but forms the major part of the people. South America, with some civilized and many wild tribes, has about 7,000,000 Indians.

AMERICAN INDIANS, Languages of the. The languages spoken by the natives received little attention in the English colonies; but in French, Spanish, and Portuguese America a more or less extended Indian literature grew up, with grammars and dictionaries of many of the languages. Charlevoix was perhaps the first to call attention to the languages as the surest mode of tracing the origin and affiliation of tribes. Hervas, availing himself of the labors of many members of the society of Jesus who had been driven from Spanish America, first in his catalogue of languages made a step toward a collection and comparison of the whole. Smith Barton made the first attempt in the United States to reduce the languages to system. Duponceau and Schoolcraft followed him. The Humboldts gave an impulse toward a philosophical treatment of the study, and Balbi in his *Atlas ethnographique* popularized the information acquired. At a later date Albert Gallatin performed an immense service by securing new, full, and harmonious vocabularies, and tracing many remote and overlooked affinities, so that his work has become the real basis for all subsequent labors as to the tribes of the United States. Turner devoted many years of philosophical and accurate investigation to the subject. In Europe Adelung philosophically arranged the general study, and Buschmann and others contributed to the investigations of particular families of languages. Orozco and Pimentel classified the languages of Mexico, Squier those of Central America and Peru, Brasseur de Bourbourg and the accurate Behrendt also elucidating those of Central America. Those who have labored on single dialects in Europe and America are too numerous to note. Ludewig became the bibliographer of the labors in this field in his "Literature of American Aboriginal Languages" (London, 1848).—The languages of America form a group apart, no one having been found that can take its place as a dialect of any in any other quarter of the globe. They have features common to all, one being the predominance of the verb, by which the verb, subject, and object, direct and indirect, are often conjugated together as one word. In alphabetic power some, like the Iroquois, have no labials; the Mexican wants *b*, *d*, *f*, *g*, *r*, *s*, and the aspirate; the Choctaw has no *d* or *g* hard; the Otomi, no *l*, *r*, or *s*, but it has an emphatic *k* and *t;* the Quichua has a guttural *h*, emphatic *p*, *t*, and *s*, and aspirated *p*, *t*, and *k*. The Otomi, Athabascan, and many of the northwestern tribes have singularly confused, peculiar, or clucking sounds, often impossible to denote. Almost all known American languages have comparatively limited vocabularies, and lack abstract or general terms. Many have, for instance, no word for brother in general, but separate words for elder and younger brother, differing again according as spoken by another brother or a sister. So there will be no general word for "to fish," but distinct words for fishing with a net, spearing, spearing through the ice, fire-fishing, &c. Some have two sets of numerals, one for man and a few objects deemed of highest importance, the other for everything else; and some have even a third set of numerals for money.—We can give only a general view of the American languages. I. NORTH AMERICAN. The general name of Esquimaux (raw-fish-eaters) comprehends all the languages of Greenland and of the northern countries, from the coast of Labrador to Behring strait and the peninsula of Alaska, including also that of the settled Tchuktchis of Siberia. They consist of two groups: the eastern or Esquimaux proper, with three dialects in Greenland, Labrador, and on the N. and W. shores of Hudson bay; the western, with the idioms of the Tchugatches, Aleutians, and both American and Asiatic Tchuktchis, which differ more one from another than those of the eastern group. The dialect on Winter or Melville island lacks the sounds *f*, *g*, *r*, *z*. As in almost all American languages, the pronunciation is, so to speak, pectoral, and the consonants are indistinct. The Esquimaux have words for all shades of meaning in which an object is taken, according to its age, sex, and other categories. Many suffixes and few postpositions denote the accidents of declension, comparison, and conjugation. Examples of words: *kernertok*, (who is) black; *aglegiartorasuarpok*, he quickly goes away to write. Numeration proceeds by 20. For the Hudson bay dialect, see the works of Dobbs, I. Long, and Parry; for that of Kotzebue sound, see Beechey; for that of the Tchuktchis, see Kosheloff and Khromensko. —The language of the Karalits (Greenlanders) lacks *d*, *f*, *h*, *z*, and, as initials, *b*, *g*, *l*, *v;* abounds in *t*, *k*, *r;* and accumulates hard syllables, although the people have a fine ear and musical taste. There are three dialects, viz.: the Kamuk of Upernavik; that of the isle of Disco, the purest; and the southern, of Julianeshaab. Numerals beyond 5 are compounded; 20 is designated by the words "hands and feet," &c. For grammars of their tongue, see Thorhallesen (1776), and P. Egede (1760), who also made a dictionary, as well as O. Fabricius (1791–1804).—On the northwest of the American continent, south of the Esquimaux, is the family of the Koloshes, found about Alaska. South of the Esquimaux, on the east and south of Hudson bay, and running west in a narrow strip along the Saskatchewan to the Rocky mountains, and extending from the Red and Mississippi east to the Atlantic as far down as lat. 36°, was the extensive Algonquin family. It occupied the whole of this vast territory, to the exclusion of all other races except the Winnebagoes on Lake Michigan, who belonged to the Dakota family, and the Huron-Iroquois family, who, surrounded by Algonquins, extended from Lake Huron to North Carolina. The Algonquin family, taking its name from tribes on the Ottawa river, Canada, comprised, above the St. Lawrence and the lakes, the Nasquapees, Montagnais, Algonquins, Ottawas, and Kilistinons or Crees; on the Atlantic coast, the Micmacs, Abenakis, Sokokis, Massachusetts, Narragansetts, Mohegans, Delawares, and Virginian tribes; in the west, the Chippewas, Menomonees, Pottawattamies, Miamis, Illinois, Sacs and Foxes, Blackfeet, &c.; at the south, the Shawnees. Many of these dialects have been studied thoroughly, and many books and even papers have been printed in them. For their study we have Maillard's Micmac grammar (New York, 1864), Râle's Abenaki dictionary (Cambridge, 1833), Eliot's Massachusetts grammar (Cambridge, 1666; Boston, 1822), Roger Williams's Narragansett (1643), Edwards's Mohegan grammar (1788), Le Boulanger's Illinois grammar and dictionary (MS.), Baraga's Chippewa grammar and dictionary (1851–'3), Belcourt's Chippewa grammar (1839), House's Cree grammar (1844), Cuoq's Algonquin grammar (1866), Zeisberger's Lenni Lenape or Delaware grammar (1827). As the Algonquin was the language of the tribes on the seacoast where the English colonies were planted, it gave several words to the settlers, as wigwam, squaw, wampum, tomahawk, sachem, &c. In the Algonquin dialects there is no article, and no gender, words being used when necessary to designate the male and female of animals and birds. The only division is into what has been called noble and ignoble, or by some animate and inanimate. The Delaware made trees noble, grass ignoble. Possession is designated by a form like the English Peter his book—*Pien o masinaigan*. It has two numbers, though some from the double pronoun *we* make a dual also. Nouns receive by suffixes modifications that some term cases; but nouns like verbs undergo a kind of conjugation by the prefixing of possessive pronouns. Thus in Delaware: *ooch*, father; *nooch*, my father; *kooch*, thy father; *noochenana*, our fathers; *koochuwa*, your father; *koochewawa*, your fathers. Algonquin: *ni micomis*, my grandfather; *ki micomis*, thy grandfather; *omicomisan*, his grandfather; *ni* (or *ki*) *micomisinan*, our grandfather; *ki micomisiwa*, your grandfather; *omicomisiwan*, their grandfather. Verbs take a multiplicity of forms, not only positive, negative, reflective, and reciprocal, but animate and inanimate. Thus in Algonquin: *ni sakiha*, I love him (animate); *ni sakiton*, I love it (inanimate); *ki sakiha*, thou lovest him; *osakihan*, he loves him; but *ki sakih*, thou lovest me; *ki sakihimin*, thou lovest us; *ki sakihim*, you love me; *ki sakihin*, I love thee; *ki sakihinimin*, we love thee. In all these there are two forms of *we:* he and I, *ni;* thou and I (with or without others), *ki*. In Delaware: *ndahoala*, I love; *kdahoala*, thou; *wdahoala*, he; *ndahoalaneen*, we; *kdahoalohhumo*, you; *wdahoalewak*, they; *ndahoatell*, I love thee; *kdahoali*, thou lovest me. The passive in Algonquin is *ni sakihigo*, I am loved; in Delaware, *ndahoalgussi*. I am loved by him (Alg.), *ni sakihik*.—The Huron-Iroquois family comprised, in Upper Canada, the Hurons or Wyandots, Tionontates, Attiwandaronk; the Iroquois, Hodenosaunee, or Five Nations in New York; the Minquas, Andastes, or Susquehannas in Pennsylvania; the Nottoways, Meherrin, &c., in Virginia; the Tuscaroras in Carolina, and subsequently in New York. The dialects generally lack the labials. Of those that have been most studied is the Mohawk, into which the Book of Common Prayer and portions of the Bible have been translated, as well as Roman Catholic manuals of prayer, catechisms, &c. The radical words of this dialect, by Bruyas, were published at New York in 1863; a short grammar by Cuoq, Montreal, 1866. Of the Onondaga, there is a dictionary published in 1860; of the Seneca, a spelling book and some minor works. In Iroquois dialects the verbs have two distinctly marked paradigms, each containing five regular conjugations. In the paradigm *k* there are 15 persons, I, thou, he, she, and an indefinite pronoun like the French *on;* thou and I, he and I, you two, they two masculine, they two feminine, making five dual forms; and for the plural, you and we, they and we, you, they masculine, they feminine. In all the verbal relations pronouns in their separate form are replaced by affixes which modify the initials of the persons. M. Cuoq adds to the three numbers another, the indeterminate. Every noun is or may become a verb. There are no articles, no prepositions, and few adjectives, adverbs, or conjunctions. Nouns have no cases, and no gender proper, the only distinction being that of two classes, one comprising God, the angels, and males of the human race, the rest all other creatures animate or inanimate. The verb assumes reflective, reciprocal, and passive forms by inserting syllables. Thus: *kenonwes*, I love; *katatenonwes*, I love myself; *tetiatatenonwes*, we love one another. The pronoun object enters into the verb, as *rinonwes*, I love him. Verbs of the paradigm *w* have four persons less than those in *k;* but strangely, the perfect in verbs of *k*, and all their derivatives, are conjugated under the paradigm *w*. Indicative present: *kenonwes*, I love; *senonwes*, thou lovest; *ranonwes*, he loves; *kanonwes*, she loves; *ienonwes*, some one loves. Perfect: *wakenonwehon*, I have loved; *sanonwehon*, thou; *rononwehon*, he; *wnonwehon*, she; *iakononwehon*, some one. Present: *wakeriwaien*, I am busy; *sariwaien*, thou; *roriwaien*, he; *ioriwaien*, she; *iakoriwaien*, some one. —West of Hudson bay, above the Churchill river, were the northern part of the Athabascan family, some tribes of which dwelt on the shores of the Pacific, and the main body extending south to the Dakotas, while the southern part of the family occupied the frontier between the United States and Mexico. The tribes are strangely different in character, the northern being timid, the southern fierce and bold. The chief tribes at the north were the Chipewyans, Tahculli or Carriers, Dog Rib Indians, Sussees, Tlatskanai, Umpquas, Kwalhioqua, Kenai, &c. Of the southern, the most conspicuous tribes are the Apaches, Navajoes, and Lipans. Of this family we have little to show the grammar or affinities.—South of the Athabascan family, and between the Mississippi and the Rocky mountains, were the Dakota family, extending as far south as the Arkansas river, and having one tribe on Lake Michigan, the Ochungaras, called by the Algonquins Winnebagoes. The Dakota family includes the Assiniboins, the Dakotas or Sioux, Iowas, Omahas, Puncahs, Missouris, Osages, Kansas, Ottoes, Arkansas, Mandans, Minnetares, and Crows. In Dakota there are separate and incorporated pronouns. There is a dual first person, we (thou and I), but there is no incorporated pronoun for the third person in either number, so that the third person singular is the simplest form of the verb. Verbs have an indicative, imperative, and infinitive, and two tenses, an indefinite and a future. A few examples will suffice: *Kashka*, he binds; *yakashka*, thou bindest; *wakashka*, I bind; *unkashka*, we two bind; *kashkapi*, they bind; *yakashkapi*, ye bind; *unkashkapi*, we bind. In other cases the pronouns are introduced, as *manon*, he steals; *mayanon*, thou stealest. There are some irregular forms, as *hiyu*, he comes; *hidu*, thou comest; *hibu*, I come. The pronoun object enters into the verb: *kashka*, he binds him, her, it; *nicashka*, he binds thee; *makashka*, he binds me. Case is shown by position, possession by the possessive at the end: *wichashtayatapi tipi tawa*, chief house his, *i. e.*, the chief's house. The plural is formed by adding *pi* to nouns and verbs. There is a grammar and dictionary of the Dakota by the Rev. S. R. Rigg (Washington, 1852), and an Iowa grammar by Irvin and Hamilton (1848).—Adjoining this family were the Pawnees, embracing the Pawnees, Rickarees, Huecos, and Wichitas, roving bands long known, but as to whose language our knowledge is confined to vocabularies.—Next to the Athabascan family on the Pacific coast are the Kitunahas or Flatbows, and the large family of the Selish, embracing the Shushwaps or Atnahs, Flatheads, Skitsuish or Cœurs d'Alêne, Piskwans, Clallam, Lummi, Simiamu, Songhus, and some other tribes. Their language has been made known by the *Grammatica Linguæ Selicæ*, a Selish or Flathead grammar, by Mengarini (New York, 1861). The Selish lacks *b*, *d*, *f*, *r*, and *v; g* is guttural like the Spanish *j; ck* is very hard; it has a peculiar *b*, pronounced with the tongue at the palate. Nouns have no cases, but form plurals by doubling the roots, as *skoi*, mother, *skoikoi*, mothers, and in several other modes. It has absolute pronouns and copulative pronouns, the latter used in connection with verbs. The verb *to be* exists and enters into the conjugation of indeterminate verbs. The determinate active verb is thus conjugated: *Ies kólm*, I do (something definite); *as kólm*, thou dost; *ès kól m*, he does; *kaes kólm*, we do; *ès kól mp*, you do; *es koolm*, they do. Perfect: *kol n*, I did; *kól ntgu*, thou didst. The relative forms vary thus: *ku iès asgam*, I see thee; *ko as asgam*, thou seest me; *ies asgam*, I see him; *ko es asgams*, he sees me. —The Sahaptin family, bounded on the north by the Selish, comprise the Sahaptin or Nez Percés and the Wallawallas, running east to the Rocky mountains and south to the Shoshonees. The Wallawallas comprise several tribes, the Yakamas, Palus, Klikatats, and Tairtla. The study of their language is aided by Pandosy's "Grammar and Dictionary of the Yakama Language" (New York, 1862). The language is remarkable for the multiplicity of its pronouns, and for a twofold conjugation of its verbs, one with the tense form unchanged for the persons preceded by the pronoun, the other with the tense form modified by a pronominal suffix, except in the third person, where it is affixed.—Below them are the Wailatpu family, comprising the Cayuse and Molele. Beyond this family were the once numerous Chinook family, embracing a number of tribes from the mouth of the Columbia to the Grand Dalles. They have disappeared with fearful rapidity, and the fullest vocabulary is that by George Gibbs (New York, 1863). Below and above these on the coast were scattered tribes and families, whose relation to others will never perhaps be now known from the utter want of material of an extended character.—The Shoshonees, another important family, comprise the East and West Shoshonees, on the head waters of the Missouri and Columbia; the Bannacks, on Snake river; the Comanches, from the head waters of the Brazos to those of the Arkansas and Missouri; the Yutes and Pa Utes, in Utah territory; the Kioways, in Texas; and several tribes in California, the Kizh of San Gabriel, the Netela of San Juan Capistrano, the Kechi of San Luis Rey, the Cahuillos, and perhaps the Moquis. The other California tribes belonged to several distinct families. Arroyo's grammar and vocabulary of the Mutsun (New York, 1861–'2) affords material for studying that language, spoken at San Juan Bautista, Monterey county, at La Soledad on Salinas river, and by the Rumsens or Achastlians at San Carlos. A vocabulary with some grammatical notes on the language spoken at the mission of San Antonio shows the absence of pronouns in the third person and great simplicity of forms. The languages of the Pueblo Indians of New Mexico form a class by themselves.—South of the Algonquins were the family of the Catawbas and Waccoa in the Carolinas; and the very extensive family of the Cherokees, embracing the Ottare and Ayrate. Their language, which has analogies with the Iroquois dialects, is remarkable as the only one in which the natives have adopted an alphabet. It was invented by Sequoyah or George Guess, a half-breed, in 1826. His scheme consists of 85 characters, including six vowels, *a*, *e*, *i*, *o*, *u*, and the French nasal *un;* and nine simple and three combined initial consonants, *g*, *h*, *l*, *m*, *n*, *kv*, *s*, *d*, *dl*, *ts*, *w*, *y*, to which the vowels are attached. The sounds *k* and *g*, *t* and *d* occur almost promiscuously, and *dl* or *tl* are sometimes written *kl*. As in most languages, there are two forms of *we*, viz., the prefix *in* for I and thou, and *ast* for I and he; as *inaluniha*, I and thou bind it; *astaluniha*, I and he bind it. Plurality is denoted by the prefix *t* or *te*, as *tetsigawati*, I see things. Continuative action is indicated by the suffixes *sa* and *i*, as *tsikeyusa*, I love him unceasingly. The perfect tense is of two sorts, one used when the narrator was present at the action, the other when he was absent; thus: *uhlun*, he killed him (in my presence), and *uhlei* (in my absence). The transitions of the verb are either, 1, as animate, or 2, as inanimate; thus: 1, *galuniha*, I bind it (an animal or tree); *haluniha*, second person; *kahluniha*, third person; dual: *inaluniha*, I and thou bind it; *astaluniha*, I and he bind it; *istaluniha*, ye two bind it; plural, *italuniha*, we bind it; 2, *galunihawi*, I bind habitually, or am in the habit of binding, &c. Objects are frequently expressed merely by changes of the verb, as *kutuwo*, I am washing myself; *kulestula*, I am washing my head; *tsestula*, I am washing another person's head, &c., through 13 different forms. All words of relations between parts of speech are postpositions. Parts of the Bible and books of elementary instruction and newspapers constitute the Cherokee literature.—Below the Cherokees were the Muskokees or Creeks, the Choctaws and Chickasaws, the last two speaking the same language, the first a language bearing strong analogies to it. The Spaniards cultivated the Timuquan, a Choctaw dialect, and a grammar, catechism, &c., were printed in it as early as 1613–'27. The Choctaw proper has been thoroughly investigated in our time by the late Rev. Cyrus Byington, whose "Definer" (1852) and "Choctaw Grammar" (Philadelphia, 1870) give very satisfactory means of study. The language is remarkable for its multitudinous particles with nice shades of meaning. It has the usual separable and inseparable pronouns, and the double we. Like the Dakota, Mexican, San Antonio, and some others, the third person singular of the present of the verb has no pronoun, and gives the simplest form of the verb. The inseparable pronoun for the first person is a suffix; for the second, an affix: *Takchih*, he, she, or it ties, or they tie him, her, it, or them; *ishtakchih*, thou tiest him, &c.; *takchilih*, I tie, &c. Among the peculiarities is a pronoun used among those related by marriage. The Muskokee language is divided into the Muskokee proper or main Creek and the Hitchitee. The only grammar is that by Buckner (New York, 1860). The verb in its modifications differs from the Choctaw. *Issetv* (*v* representing an obscure sound), to take; *esais*, I take it; *esichkis*, thou takest it; *esis*, he takes it, &c. Neither Creek nor Choctaw has the sound of *a* in fate or the letters *d*, *g*, *j*, *r*, *v*, or *z*.—The Natchez, on the Mississippi, had a peculiar language which has some analogy with the Maya. Of the other Louisiana tribes our data are limited; the Chetimachas and Attakapas had languages that enter into no known group. Those of Texas were studied by the Spanish missionaries, and works were printed in them, but their affiliations are not known.—The languages of Mexico have been classified by recent scholars, Orozco and Pimentel. The first family is the Mexican, including the Nahoa, the Pipil in Central America, the Zacateco, the Chimarra and Concho in Chihuahua, the Ahualulco in Tabasco, the Jalisco, the Acaxee, the Sabaibo in Durango, the Xixime and Tebaca in Sinaloa. It extended from the Gila and Rio del Norte to Guatemala. As the language of one of the most civilized races in the new world, it was studied by the Spaniards and cultivated, a professorship being founded in the university of Mexico. A number of grammars have appeared, by Olmoz (1555), Molina (1571), Rincon (1595), Guzman (1643), Vetancurt (1673), Avila (1717), Zenteno (1753), Aldama (1754), and Sandoval (1810); and the dictionary of Molina (1571) is very full. A general view of the language by Albert Gallatin will be found in the "Transactions of the American Ethnological Society," vol. i. The Mexican language lacks the sounds *b*, *d*, *g*, *r*, *j* (Spanish), *ll* (Span.), and *gn* (Italian), but it abounds in *t*, *z*, *ch* (Span.), *tz*, and in the syllables *tla*, *tli*, *atl*, *itl;* *x* is pronounced with a peculiar guttural sound. The tone generally strikes the penultimate of the polysyllabic expressions, in which the particles *ca* and *ti* predominate. Gender is distinguished in animals by the prefix *okich*, male, *cihua*, female. There is only one variation for case, *é* being added for a vocative by men, but only an accent on the last syllable by women. As a general thing, inanimate things have no different form for singular or plural; some have, as *milli*, sowed ground, plural *miltin*. Of plurals of animate nouns these are samples: *Ichcatl*, a sheep, *ichcame*, sheep; *coatl*, a snake, *cocoa*, snakes; *tatli*, father, *tatin*, fathers. All nouns may unite with four particles: *tzin* or *tzintli*, signifying respect; *ton* or *tonth*, depreciating; *pol*, signifying excess; *pil*, diminutive implying affection: as *ichcapil*, a lamb (dear little sheep). Possessive affixes are *no*, *mo*, *i*, *to*, *anmó*, *in*. *Calli*, house; *nocal*, my house; *nomill*, my sowed ground; *ical*, his house; *icxitl*, foot; *nocxi*, my foot; *teotl*, God; *noteouh*, my God; dropping a termination, and sometimes substituting another. The inseparable pronouns for conjugations are: 1st person singular, *ni;* 2d, *ti;* plural, 1st, *ti* (strongly accented); 2d, *an*, *am*. *Ninemi*, I live or walk; *tinemi*, thou; *nemi*, he; *tinemi*, we; *annemi*, you; *nemi*, they. In the imperative, *ti* and *an*, of the 2d person, change to *xi*, and *ma* is prefixed to all persons. *Ma* or *macuela* is prefixed for the optative. Participles are wanting. It has the usual transitions. *Ni tlazotla*, I love; *nino tlazotla*, I love myself; *ni pia*, I guard, *e. g.*, John; *ni tlapia*, I guard him; *ni tepia*, I guard it, &c. The Mexican has given us two common words, tomato (*tomatl*, waterberry) and ocelot (*ocelotl*).—The next family is the Otomi or Hiahiu (pronounced Hianghiung), a monosyllabic language resembling the Chinese. Its dialect is the Mazahui. The Otomi is spoken in Mexico, Michoacan, San Luis Potosi, Querétaro, most of Guanajuato, and parts of Puebla and Vera Cruz. Its grammar is peculiar from the fact that the verb remains unchanged, the pronoun being conjugated. It has many words of the same letters distinguished by the intonation. It lacks *f*, *l*, *r*, and *s*, and abounds in guttural and nasal sounds; has a peculiar *c* (*cc*=*qq*), pronounced with the root of the tongue and palate; a dental *t* (*tt*); and a variety of vowel sounds quite unusual, *a* having four, *e* four, *i* three, *u* four; and *z* has three sounds. Distinctions are made by prefixing *na*, *ma*, *xa:* *nho* or *manho*, good; *xanho*, a good thing; *mâdi*, to love; *nahmâdi*, love.—The Huaxteco-Maya-Quiche is a remarkable language, extending over a very wide range, of which the Huaxteco seems a northern offshoot. It is spoken with the Totonac in Puebla, Vera Cruz, and San Luis Potosi. The Maya proper and its dialects, the Lacandon, Peten, Caribe, Chañubal, and Punctunc, are spoken in Yucatan, Chiapas, and Tabasco; while its kindred tongue, the Chontal, prevails in Tabasco, Oajaca, Guerrero, and Guatemala; the Quiche and Mam in Chiapas and Guatemala; the Tzendal and Tzotzil in Chiapas; the Col in Chiapas and Guatemala, with the Totzlem. Gage made the Poconcho, a dialect of the Mam, known to English readers two centuries ago. In our time extensive studies have been made as to it by Squier, Behrendt, and Brasseur de Bourbourg. It resembles the Otomi in monosyllabism and tones; it has six gutturals which are extremely rough; it lacks the sounds of *d*, *f*, *g*, *r*, *s;* its words are not inflected. The plural is formed by *ob*, the comparative by *il;* thus: *che-ob*, woods; *tib-il*, better. There are four conjugations. The language abounds in elisions. As spoken in a district of Valladolid, it is praised for elegance and conciseness. By many the Chontal is supposed to have been the language of Cuba and Hayti, the tongue which has given us the earliest words that were adopted into European languages, tobacco, canoe, &c.—The Mixteca-Zapoteca language has several dialects: the Chocho in Puebla, Oajaca, and Guerrero; the Yope in the two latter states; the Popoloco or Teca in Michoacan, Jalisco, and Guatemala; the Amuchco in Guerrero; the Zapoteca and Cuicateco in Oajaca. A Mixteca grammar by Antonio de los Reyes and a vocabulary by Alvarado were printed at Mexico in 1593; a grammar of the Zapoteca by Cordova was printed there in 1564, and a vocabulary by the same author in 1578. The Matlaltzinca or Pirinda is spoken in Michoacan; the Ocuilteca in the state of Mexico seems related to it. Of this grammars were written, but none have been published. The Tarasco prevails in Michoacan, Guerrero, Guanajuato, and Jalisco. In this language *f* and *l* are wanting; and *b*, *d*, *g*, *i*, and *r* never begin a word. Nouns are divided into rational, irrational, and inanimate. There are absolute and inseparable pronouns. In conjugating the inseparables are suffixed: *Pa*, to carry; *pa haca*, I carry; *pangahaca*, I am carried; *panstahaca*, I am always carrying; *pacata*, that which is carried, a burthen. There is a Tarasca grammar by Baselenque (Mexico, 1714), of which a sketch is given in the "Transactions of the American Ethnological Society," vol. i., pp. 245, &c.—The Opata-Tarahumara-Pima family embraced a number of dialects spoken by tribes in Sonora, California, and Arizona; the Opata and Eudeve in Sonora; the Jova in Sonora and Chihuahua; the Pima with its dialects, the Papago, Sobaipuris, Yuma, and Cahuenche, in Sonora; the Tarahumara in Chihuahua, with dialects in Durango and Sonora; and the kindred Tepehuan in Durango, Jalisco, Chihuahua, Coahuila, and Sinaloa. This family also includes the Cahita, Cora, and Colotlan. A grammar of the Pima or Nevome (New York, 1862) shows it to lack the sound of *a* in fate, *f*, *l*, and *z;* *b* and *p*, *d* and *t*, *c* and *g* are easily confounded; contractions are numerous. There is but one conjugation of the verbs, and the verbal form in each remains the same in each tense, the pronoun and prefixes varying with the persons. The active verb is simple compared to the passive: *ani haquiarida*, I count; *ani haquiaridcada*, I counted; *ni vusi vointad'am'igui*, I was assisted. Verbs of possession are made from nouns: *hunu*, maize; *hunuga*, to have maize. See too "A Sketch of the Heve (Eudeve) Language," by Buckingham Smith (New York, 1861).—The Seris, including the Upanguaima and Guaima, were in Sonora. In Lower California were two families: the Guaicuru, with five dialects, the Cora, Uchita, Concho, and

Laymon; and the Cochimi, with three, North Cochimi, Edu, and Didu. Of the Guaicuru our best notice is in Begert's *Nachrichten* (Mannheim, 1772), of which Rau has given a translation.—In Central America, besides the Maya and Mexican already noticed, there were families which Squier supposes affiliated with the Guaranis and Caribs. For the study of these we have Cotheal and Henderson's "Grammatical Sketch of the Mosquito" (New York, 1846), Scherzer on the Valientes and Talamancos, Squier's vocabularies, and his monograph of authors on the languages of Central America (London, 1861). II. SOUTH AMERICAN. The Caribs (whose vernacular name was Calina or Galibi) once dwelt on the shores of Colombia, in Guiana, and on the Lesser Antilles. They speak about 30 dialects, which are very harmonious, but of a weak utterance, so that *l* and *r*, *b* and *p*, *g* and *k* are almost alike. Nearly all words end in vowels. Conjunctions conclude the sentence; animate and inanimate things have different forms of expression. Terminations of cases: dative *va*, accusative *pona*, ablative *ta*. Persons: masc. *au*, *inara*, fem. *nuçuya*, *niuro*, I; *nana*, we; *amoro*, *iburra*, *amenle*, thou; *hocoya*, you; *likia*, he; *moscan*, they. Possessives: prefix *e*, my; *a*, thy; suffix *o*, his. Verbal pronouns: prefix *s*, 1st person; *m*, 2d; *n*, 3d; plural, *nanan*, &c. Of the principal Caribbean dialects, the Chaymas is spoken in Cumaná. The Tamanaca has more verbs obtained by means of prefixes than perhaps any other language; it lacks *f*, *s*, and *g*, has six conjugations, many tenses (a preterite of yesterday, another of two weeks ago, a third of six months and more ago), and forms for near, others for distant objects; the auxiliary of the passive is *uocciri*, to be; brother and sister are distinguished as to age, as in Magyar and other Uralo-Altaic tongues. The Arrawak, on the banks of the Berbice and Surinam, has many remarkable peculiarities, such as the formation of the passive voice by changing the final *n* of the infinitive active into *hun*, and many prefixes and suffixes. Caribbean grammars were published by Fathers Tauste, Ruiz Blanco, R. R. Breton, and Gilj, and dictionaries by the first and last named (1665–'7), and an anonymous one (Paris, 1763). Some writers represent the Caribbean language as a branch of the Guarani, which they divide into the southern or Guarani proper, the middle or Tupi of Brazil, from the island of Santa Catarina to the mouths of the Amazon, and the northern or Caribbean.—The following seven languages are worth notice, viz.: 1. That of the Mozcas (Muyscas), who before the advent of Europeans inhabited the table land of Bogotá, and who in consequence of a culture higher than that of their neighbors extended their idiom among them. It once prevailed in the city of Bogotá, but is now extinct. It counted by 20, had a negative conjugation, and many excellent pecularities; it lacked *d* and *z*, and had an indistinct *l*. 2. Of the Saypures, on the upper Orinoco. 3. Of the Salivis, between the Meta and Guaviare, affluents of the Orinoco, and in the Venezuelan province of Casanare; full of nasal sounds. 4. Of the Ottomacas, between the Apure and Sinarucu, spoken with the utmost rapidity. 5. Of the Yaruras, between the Meta and the Casanare; it lacks *s*, abounds in the Spanish aspirate *j*, and uses the substantive verb as auxiliary of all others. 6. Of the Betoïs, on the Casanare, without *p*. 7. Of the Mainas, in the province of that name, differing from its neighbors. In the eastern parts of Colombia there are Caribbean dialects. Grammars have been prepared by Fathers Anisson, De Tauste, and De Lugo, and a vocabulary by De Tauste (1680).—The Andi-Peruvian family of nations is divided into four classes: 1. The Quichuas (pronounced with a faucal croaking sound, hence also written Qquichhuas) or Incas were more widely spread at the time of the European invasion than they are now. They differ from the other indigenous races of South America, resembling more the Mexicans, and being of a dark olive complexion. The language of the incas, however, was not intelligible to their subjects, and Fr. Lacroix supposes that it was a sort of hieratic jargon, unknown to the profane. The Puquini about Paz and Lima obstinately conceal their idiom from foreigners. The language of the Quichuas was extended, by the agency of the incas, over their whole empire; so that it was known to all officers and educated persons from Quito as far as Chili and the kingdom of Tumac, and, sporadically, as far as the banks of the Plata. It consists of five dialects: *a*, Cuzcucano, one of the most cultivated idioms of South America, spoken also by the creoles of Lima and by others; *b*, Quiteña, the hardest and most corrupt; *c*, Lamano of Truxillo; *d*, Chinchaisuyo of Lima; *e*, Calchaqui of Tucuman. The Quichua sounds very harsh and explosive; it lacks *b*, *d*, *f*, *g*, *j*, *v*, *w*, *x*, and *z*. It has cases and prepositions. The plural is generally formed by adding *cuna*. It has two forms of *we*. *Munani*, I love; *munanqui*, thou; *munan*, he; *munanchic* and *munaycu*, we; *munanquichic*, ye; *munancu*, they; *munac*, lover; *munay*, love; *munasca*, the person or thing loved. It counts by tens up to hundreds of thousands; and has a very rich and perfectly regular conjugation, even of the substantive verb. Its phraseology is simple, and the verb concludes the sentence. It was used for writing even by the incas, and the Limans prided themselves on their speaking it purely. There are grammars by Domingo de S. Tomas (1560), D. de Torres Rubio (1603), D. G. Holguin (1608), and many others; and in English, Markham's "Contributions toward a Quichua Grammar and Dictionary" (1864). 2. The Aymaras, probably descended from the high plains about Lake Titicaca (from the bosom of which Manco-Capac, the founder of the inca dynasty, was said to have risen), are almost surrounded by the Quichuas, but differ from them in manners and language. This, though it has many harsh sounds, words, and grammatical forms, is spoken by the descendants of Europeans at La Paz, and by about 400,000 aborigines. It is rich in many modified expressions (having for instance 12 homonyms of the verb to carry), abounds in postpositions, and has several dialects. There are grammars by L. Bertonio (Rome, 1613) and D. de Torres Rubio (Lima, 1616). 3. The Atacamas, numbering about 8,000, on the W. slope of the Andes. 4. The Changos, about 1,000, on the Pacific.—On the E. declivity of the Andes, in Bolivia, the Antisian family (so called from the eastern of the three Cordillera ranges, and from which the word Andes is applied to all the ranges) contains five tribes with their own tongues, viz.: the Yuracares (*yurac*, white, and *cari*, men), Mocetenes (Chunchos), Tacanas, Maropas, and Apolistas; about 15,000 in all. (Tschudi, *Antiguedades Peruanas*, Vienna, 1852.) N. W. of Bolivia, on the Ucayali, are the Panos, who used a sort of hieroglyphics, and the Carapuchos, who seem to bark in speaking. On the pampas of La Plata, drained by the Paraná and both Salados, there are about 40 tribes, especially in the forests of Chaco, of which we mention the most prominent. The Abipones, the centaurs of South America, seem to sing their long words; they have a peculiar sound, half *r* and half *g* (like the Arabic *ghain*), and count in their language only as far as three. The Mbayas (Guaycurus), on the Paraguay, also great horsemen, had an ancient idiom, and speak now the Enacagas, without nasals or gutturals; they have also a woman language (man, for instance, is called *hulegre* by men, but *aguina* by women) and castes, and are called Lenguas by the Spaniards. The Moxos, about 13,000, in Bolivia and the Brazilian province of Matto Grosso, have a mild harmonious tongue, many modified forms of verbs, and very few numerals. There is a grammar and vocabulary by P. Marban (Lima, 1701). The Chiquitos, about 15,000, in S. E. Bolivia, near the Argentine Gran Chaco, have many nasal and guttural sounds, the French *u*, and an idiom for females, as well as a language of etiquette used in addressing God and superiors.—In the vast regions E. of the river Paraguay, and of a line from its sources to the mouth of the Orinoco, thence bounded by the shores of the Atlantic and on the S. by the Plata, there is, so to speak, an archipelago of tongues in the ocean of the Guarani family. In Brazil alone Texeira counted 150 and Spix and Martius 300 tribes, with as many languages; but, as their affinities cannot be determined clearly, owing to the paucity of their consonant elements, it is impossible to know which of them are languages and which are dialects, or merely local idioms. Hervas reports 51 languages as different from the Tupi, and 16 as akin to it. This Tupi is one of the three great branches into which the language of the Guaranis is divided, viz.: 1. Eastern Guarani (the *lingoa geral*, general language of Brazil), which lacks *f*, *l*, *s*, and *v*, but has German *ch*, English *j*, French *u* (written *y*) and nasals, Spanish *ñ* and *ll;* also *mb*, *nb*, *nd*, *ng*. Cases: *aba*, homo; *abaupe*, homini; *abaki*, homine. There is no plural flexion. The comparative is formed by the suffix *ete*. Numerals do not go beyond 4, 5 being expressed by the word hand (*ambo*), 10 by two hands (*opacombo*), and higher numbers in Spanish. Pronouns: *yxe*, I, my; *nde*, thou, thy; *ae*, he; *y*, his; *oro*, we (I and he); *yande*, we (I and you); *pee*, you, *pe*, your. Verbs: *a-juca*, occido; *ere-juca*, occidis; *o-juca*, occidit, &c. Tenses are indicated by adverbs; voices and many kinds of verbs by intercalating particles. There is no substantive verb. Examples of phrases: *Co nanga xe reminbota* (Lat. *hæc omnino mihi voluntas*), I wish it; *Ne marangatu* (*mihi bonitas*), I am good; *Ori rub ybaqype tec-oar, imo-ete-pyram nde rera*, Our Father heaven-in being, hallowed-be thy name. There are grammars by Anchieta (Coimbra, 1595) and Figueira (Lisbon, 1687), a dictionary by the latter author, and a recent one by Dias (Leipsic, 1858). 2. Southern Guarani (Guarani proper), on the rivers Paraná, Paraguay, and Uruguay; spoken by many tribes. See a *Vocabulario* in França's *Chrestomathia Brazilica* (Leipsic, 1859). 3. Western Guarani, spoken by the Chiriguani (lat. 18° to 22° S.) on the Pilcomayo, the Guarayi in the missions of the Chiquitos, the Cirionos near Santa Cruz, and in 160 villages between the Chaco and Mapayo streams, in its purity. That dialects of the Tupi once prevailed over many districts is evident from the names of several tribes, such as the Tupinambas, Tupininquins, Tapiguas, Tummimirj, &c.; so that it became the most extended native idiom in South America, and was adopted by the Europeans, as well as by many heterogeneous tribes, as the medium of communication. Its analogy with the other branches of the same family and with the Caribbean aided its extension. Here also the style of female speech differs in some particulars from that of men. The Omaguas, formerly a most powerful association of tribes, were the Phœnicians of the Amazon, Japura, &c., being spread inland as far as the Rio Napo, on the affluents of the Orinoco, in Venezuela, to the S. in Solimoens, on the Pará, &c. Their language differs from all others in South America. It is monosyllabic, has nasal and guttural sounds, no gender, and a very simple conjugation. The same word has many significations, according to its tone; reciprocal verbs are formed by the suffix *ca*, and active verbs from nouns by *ta*. It points to the Otomi as well as to trans-Gangetic languages. Between the Madeira and the Tapajos the Mundurucus and Tocantins speak a tongue akin to the preceding. Other tribes on the Amazon have idioms which are related to either the Guarani or the Omagua. There are grammars of the Guarani by A. Ruiz de Montoya (Madrid, 1639), and P. Restivo, from Bandini, (1724). Montoya also published a vocabulary.—Between the rivers Doce and Pardo, and between the Atlantic and the province of Minas Geraes, we find the Botocudos, who have a language of their own, with many nasal and other peculiar sounds, although scarcely any gutturals; they use a great many vowels, but confound many articulations, as *t* and *d*, and *l*, *n*, and *r*, together; for instance, *Taru*, or *Talu*, God. Most of their words are monosyllabic. They have many onomatopœias and various figurative expressions, and they double many words; thus, *nac-nac*, sea gull; *eng-eng*, woodpecker. There are two cases, nominative and oblique, as *taru-ti-po* (courser of heaven), the sun; *taru-niep* (heaven-rest), the moon. The plural and comparative are denoted by *ruhu*, more; the superlative by *yikaram*, most. In conjugation there are two moods, infinitive and participles. There is no substantive verb; thus: *he mung*, he gone; *e reha*, it good, &c. Among the Brazilian tongues is that of the Camacans on the river Pardo, in the province of Bahia, with extremely long words, very abrupt peculiar final sounds, and many gutturals; and that of the Macharis in Porto Seguro, with most peculiar palatals and many nasals. For materials on the Brazilian languages, see the works of Léry (1578); Mimiani, on the Kiriris (1695); F. de Azara (1781); Prince Maximilian of Neuwied (1815–'17); Spix and Martius (1817–'20); Von Eschwege's vocabularies of the Puris, Coroados, Coropos, &c.; and the travels of D'Orbigny and Auguste St. Hilaire.—The Araucanian or Chilidugu, Chili language, formerly extended more northward, and is spoken by the Picunches, from Coquimbo as far as Santiago, by the Puelches about Mendoza (E. of the Cordillera), by the Huilliches on the Biobio and Valdivia, and by the independent Aucas in the south of Chili, with dialectic variations. This is probably the most harmonious and the most cultivated language among the indigenous races; its purity and elegance being so cherished, that even a preacher is often upbraided by his hearers if he commits a solecism in his sermon. It has not the Spanish aspirated *j*, *g*, nor *x*, *z*, *b*, *f*; but has a nasal *n* and *u* as in French. In the north, *d* and *r* are used for *s*, and conversely in the south. Words end in vowels and in the mild consonants, *b*, *d*, *g*, *f*, *l*, *m*, *n*, *r*; only about 20 in *s* or *z*. There is no gender; the signs of sexes are *alca*, male, and *domo*, female. The cases are three, formed by adding *ñi*, genitive; *mo*, *meu*, ablative; *egu*, instrumental. Dual, *engu*; plural, *ica*, *egn*, or by prefixing *pu*, or intercalating *que* between adjective and substantive. Persons: *inche*, I; *eimi*, thou; *taye*, he; dual: *inchu*, 1st; *eimu*, 2d; *taye epu*, 3d; plural: *inchiñ*, we; *eimn*, you; *taye culà*, they. Personal suffixes to verbs: 1, *n*; 2, *imi*; 3, *i*; dual, *yu*, *imu*, *igu*; plural, *iñ*, *imn*, *ign*. The imperfect tense is formed by intercalating *vu*; future, *a*. The infinitive ends in *n*; gerunds in *uam*, *uum*; the participle active in *lu*, passive in *el*; the conjunctive in *li*, optative in *lichi*; passive voice in *ngen* (thus, *aiūn*, to love; *aiūngen*, to be loved); negation intercalates *la* (imperative *quel*). There are more than 20 forms of transition for all sorts of modifications in the verb (more than in the Altaic languages). In short, some of the best traits of the Indo-European and the polysynthetic languages are combined in the Chilidugu. It has geometrical terms, and is skilfully employed as a rhetorical and poetical idiom. There are grammars and vocabularies by L. de Valdivia (Lima, 1607), A. Febres (1765, 1846), and B. Havestadt (Münster, 1777). The Patagonians (Tchuelhets) are divided into several tribes, such as the Tchuel-cunny (South-men), Tchuan-cunny, (North-men), &c. Falkner, an English Jesuit, gave a grammar and vocabulary of the Moluches (Hereford, 1774). It is supposed that an idiom similar to theirs is spoken by the Yacanacus, who inhabit Tierra del Fuego and the southern margin of the continent, as well as the Brunswick peninsula.

AMERICANISMS. There were peculiarly strong influences in America to cause variations in the English language from the standard of the mother country, such as the thinness of population; the novelty of numerous objects, of the mode of life, and of the system of government; the vast influx of persons speaking the languages of continental Europe and Africa; intercourse with the red men; the want of a metropolis, a court, and permanently wealthy families, which might serve as authorities; and the adoption by newspaper editors of the slang words of the multitude. But there have also been very strong influences at work to protect the English language in America from variations. These influences have been, a more extensive and thorough popular education than that of any other country, the almost universal habit of reading, an intercourse between distant districts by travelling unequalled in any other part of the world, and the extensive use of dictionaries. The consequence is, that there is more uniformity in the English language as spoken in the United States than in the tongue of any other people equally numerous; every American can with ease understand every other one; and it may safely be said that as a people the Americans speak English better than the English themselves. But the standard of the correct language still remains in the use of the learned and educated people of England.—Americanisms are of various kinds, viz.: First, new words, such as *sparse*, *backwoods*, *caucus*. Secondly, old English words in new meanings, as *block*, meaning the land or houses enclosed between four streets in a town or city; *realize*, meaning to conceive as actual; and *section*, meaning a square mile of land. Thirdly, words which were provincial in England adopted in general American use, as *wilt* for *wither*. Fourthly, words which have retained in America the meaning they had in England several hundred years ago, while in the latter country the meaning has been changed. The word *sick* is an example of this. Fifthly, words preserved in American use, which have become obsolete in England; such as *tarry*, *freshet*. Subjoined we give a list of some of the most noteworthy Americanisms, many of which are occasionally used in American newspapers, while almost all are frequently employed in conversation by the less educated people. A large proportion are of course mere vulgarisms, never used by Americans of any culture. It deserves to be remarked that many Americanisms current in the southern, western, and middle states, are not used in New England, where the language, at least as written, approximates more closely to that of the mother country.

Approbate, used instead of approve.

Bad, used in the sense of ill.

Baggage, used to signify the trunks, boxes, valises, clothing, &c., of a traveller. The English say *luggage*, and consider baggage pretentious.

Balance, meaning remainder; as, "Two of the professors were dismissed, but the balance were retained."

Board, always used to signify all kinds of boards. In England pine and fir boards are ordinarily called "deals."

Bogus, meaning counterfeit, false, fraudulent.

Border, in the sense of a greensward or line of flowers bordering on a wall, in a garden or yard; called an edging in England.

Boss, meaning an employer or superintendent of laborers.

Brash, for brittle.

Breadstuffs, much objected to by English writers 20 years ago, but now admitted to be a good word.

Buggy, denotes a light four-wheeled wagon; in England it means a two-wheeled carriage.

Buncombe, used in the phrase to "speak to Buncombe," meaning to speak only to catch the applause or favor of the vulgar. This phrase, often abbreviated "to talk Buncombe," was derived from the name of Buncombe county, N. C. A representative in congress from this county was wont to make speeches to which no one listened; observing the members leaving the house while he was speaking, he one day declared that he cared little how many left—he was not speaking to the house, but to Buncombe. The phrase soon came to mean any speech made solely to please a constituency or the public.

Bureau, universally used to the exclusion of the English "chest of drawers."

Calculate, used in the sense of think, suppose; as "I calculate I can do it."

Calico, in the United States, means printed cotton goods; in England it means only white cotton cloth.

Caption, used in the United States to mean the heading of a chapter, section, or page, is not used in England.

Clever usually means good-natured, obliging, in America, and quick-witted or intelligent in England.

Conclude is used by Americans in the sense of determine, as, "I have concluded to go." In Great Britain it is used to signify the formation of an opinion, not of an intention.

In this connection is a phrase much used in the United States, and appears to have been first brought into currency about 60 years ago, chiefly in New England periodical literature. English writers would prefer to say, "in connection with this subject."

Corn means only maize in the United States; in England it means grain generally.

County, in America, is ordinarily used after the proper noun used to designate particular counties, as "Pike county," &c. The English always say "county of," as "county of Lancaster;" and the Irish say "county Wexford," &c., omitting "of."

Creek, in most of the American states, means a small river; in England it means a small arm of the sea.

Creole properly means a person descended from European parents, born in some portion of America which belongs or did once belong to Spain; but the Americans often use the word to designate a native of the South tinctured with negro blood.

Deadhead, a person who has the use of public conveyances, the telegraph, or the mail, admission to public entertainments, &c., without payment. The transitive verb *to deadhead* is sometimes used.

Declination, the refusal to accept a nomination to office.

Dry goods, a general term used by Americans to signify such articles as are sold by linen drapers, haberdashers, mercers, drapers, hosiers, &c. The word "haberdashery" is almost unknown to the United States.

Dress, the word almost universally used by American women to designate their gowns.

Elect, used intransitively in the sense of choose; as, in a division of property, "He elected to take the real estate."

Endorse, a word adopted from commercial usage to signify sanction, approve, confirm.

Eventuate, meaning to result in.

Expect, misused in application to past events; as, "I expect it was."

Fall, meaning autumn.

Fancy, used as an adjective to signify fantastic, various. It is frequently used on signs of shops where assorted goods are sold; thus, "Fancy Store." Whatever is ornamental rather than useful, fantastic, adapted to gratify luxurious tastes rather than necessary wants, more elegant than substantial, figured as opposed to plain, may be described as "fancy." Thus there are "fancy silks," "fancy horses," &c. For analogous reasons the term is also applied to certain classes of men and women.

Fish-dealer, the American name for a fishmonger.

Fix in England means to fasten or make firm; in America it means almost anything in the way of putting in order, adjusting, mending, setting to rights, or making.

Fleshy for stout.

Freshet, meaning a flood, is not recognized in England as a good word; but it was used several centuries ago by good English writers.

Frock is the name sometimes given by American women to their gown. Ogilvie says frock is now used in England "for a loose garment or shirt worn by men over their other clothes, and for a kind of gown, open behind, worn by females."

Fruit-dealer, the name generally given in the United States to fruiterers and green-grocers.

Gerrymander, a method of arranging election districts so that the political party making the arrangements will be enabled to elect a greater number of representatives than they could on a fair system of districting, and more than they should have in proportion to their numerical strength. The word was derived from the name of Elbridge Gerry, a signer of the Declaration of Independence, who was accused of being the first to practice this species of fraud on the rights of the people while governor of Massachusetts.

Go ahead is of American origin, and is used by Americans in cases where the British would say "All right."

Guess, used as "think;" as, "I guess I do," "I guess so."

Hack usually means a hackney-coach in America; in England it means a livery stable horse, or one merely used for travelling and routine work.

Hardware merchant, or *hardware dealer*, is the American name for an ironmonger.

Help is frequently used in the United States to signify servant, servants, or service.

Hold on is a common Americanism for "stop." It is probably derived from the German *halt an*.

Homely means plain-featured or ugly in the United States; in England, it means pertaining to home, plain, simple, unadorned.

Improve is an Americanism for opening a farm on wild land by cutting away the wood and brush, erecting buildings and fences, ploughing the ground and putting it in order. The buildings and fences are styled improvements.

Levee, in the United States, is often applied to ceremonious reception parties given by official personages, whether in the morning or evening. In England the word is restricted to morning receptions.

Loafer, Americanism for lounger or vagabond.

Loan, frequently used in the United States as a verb, but seldom in England, where lend is the usual word.

Lobby, verb, to attempt to exercise an influence on members of a legislative body by persons not members.

Locate, to determine and designate the place of, to settle in.

Logrolling (with the verb *to logroll*), a system of management by which a member of a deliberative or legislative body attempts to secure the adoption of a favorite measure, by inducing other members to vote for it in return for assistance in carrying their several pet measures. It originated in the mutual aid of the early settlers in clearing trees from the land.

Lot, a small tract of land, such as the subdivisions in towns. The English usually say "allotment."

Lumber means trash in England; in the United States, sawn wood for building and other mechanical purposes. Lumbering means making lumber; lumberman, one engaged in making it; and lumber merchant, one who sells it.

Mad is frequently used by Americans to signify angry; it is not so used by the English.

Mail is the ordinary word used in the United States to express the ideas conveyed by "post" in England. Americans say "mail a letter," "send it by mail." In such expressions the English say "post."

Molasses is used in the United States to signify treacle as well as molasses. Properly, the former is the drainage from sugar in the process of refining, the latter from sugar in the process of making. Molasses comes from the sugar plantations, treacle from sugar refineries.

Narrate has been objected to as a bad Americanism, but it is used by English authors, is found in English dictionaries, and is of English origin.

Necessitate is an Americanism much objected to by English writers.

Nightfall and *afternight* are expressions common in the United States, but not used in England.

Notify, in the United States, means to give notice to; in England it means to make known. The American says, "You must notify the drawer of the protest." The Englishman says, "The protest must be notified to the drawer."

Obligate, sometimes used by American writers, is objected to by English lexicographers as a low word.

Obnoxious is used much more frequently in the United States than in England, where offensive is preferred.

On is often used by Americans in such phrases as, "He lives on a street," "He took passage on a steamboat," &c. The Englishman would use "in."

Pantaloons (or more commonly *pants*), the common American name for trousers.

Pipe-laying, fraudulent voting, and schemes or means to obtain fraudulent votes. The word had its origin in New York, at the time of the construction of the Croton water works. Some leaders of the whig party were charged with having made arrangements to bring a large number of men from Philadelphia, ostensibly to lay pipes for the water, but really to vote at an approaching election.

Pond, a pool or body of water smaller than a lake, with either natural or artificial banks. In England, "pond" implies that the water is confined by an artificial bank.

Posted, well informed, thoroughly conversant with.

Quite, in the sense of "very," is in universal use by Americans, in such phrases as, "It is quite cold."

Railroad, railroad track, railroad depot, and railroad car, are the American names for the English railway, railway line, railway station, and railway carriage. The American travels "in the cars," the Englishman "by the rail." In the United States the iron horse is ordinarily a "locomotive;" in Britain it is an "engine."

Rapids, that portion of a river where the current is so swift that the surface of the water is broken by short waves or by low falls.

Reckon, used in the southern and western states instead of suppose, think; as, "I reckon he does;" "That'll do, I reckon."

Reliable, for trustworthy, has been adopted in the common use of England, but is not employed by careful writers.

Ride, in the United States, means riding either in a wagon or on horseback. The English restrict "ride" to horseback. In America, "to drive" means to hold the reins; in England it does not. Ride was formerly used by the English as it is now used by the Americans.

River is always placed by the English before the proper name when speaking of a particular stream, as "the river Thames." The Americans generally place "river" after the proper name, as "the Ohio river."

Roil, to render turbid, a provincial word in England, is in general use throughout the United States, where it also means to make angry.

Rooster is an Americanism for "cock," a male barn-door fowl.

Sick is the ordinary American word for ill, but is used by the English chiefly to express sickness at the stomach.

Skedaddle, to run away—a word introduced during the civil war, and at that time in general use.

Sleigh, for the English "sledge." The English go "sledge-driving;" the Americans go "sleigh-riding."

Span is an Americanism for pair, applied only to horses or mules. It is derived from the German *Gespann*.

Stage, for stage coach; rarely so used by the English.

Stall is used in the United States to signify stick fast; as, "The horses are stalled," "The wagon is stalled," &c.

Stoop is an Americanism, derived from the Dutch, meaning the steps at the entrance of a house, doorsteps, a porch, a piazza, a platform of stone or wood before a door.

Store is the usual American name for a shop; and shop is rarely used except to designate a place where mechanical labor is done. Such terms as "book store," "shoe store," "grocery store," "liquor store," "drug store," are always used by the Americans to the exclusion of "book shop," &c.

Suspenders is the proper, as gallowses is the vulgar, American name for the articles known in England as braces.

Suspicion is sometimes used in western American newspapers as a verb instead of suspect.

Switch, in speaking of railroads, as, "to switch off." The English say "shunt."

Tavern, a place where travellers are entertained and lodged. In England it means a place where liquors are sold and entertainment (but not lodging) is provided for parties.

Ticket is used by the Americans in many ways unknown to the English. Politically it means a list of candidates at an election. When an American engages a passage on a railroad, he purchases a ticket; the Englishman is booked at the office. The American purchases a "through ticket" or a "way ticket;" the Englishman is booked for a portion or the whole distance of his intended journey.

Timber, in the sense of forest or grove; as "the house stands at the edge of the timber."

Transient, in such phrases as a "transient person," meaning a person staying at a place for a short time, a stranger, a traveller, is not used in that sense in England.

Venison, deer meat; in England, wild meat generally.

Waggon or *wagon*, according to the usual American spelling, is frequently used in the United States as a verb; thus, "The goods were wagoned across the mountains."

Will is generally used by the natives of the southern, western, and middle states, in the first person, instead of shall, when they merely wish to express an expectation.

Woods is the common American name for what the English term "a wood."

Vocabularies of Americanisms have been published by John Pickering (Boston, 1816), John Russell Bartlett (New York, 1848, new ed., revised, 1859), and Prof. Schele de Vere (New York, 1872). Such multitudes of slang words are made every year in America and circulated by careless or flippant writers, that if they were all collected they might before long equal in number the 60,000 provincialisms of England. Fortunately they are generally used with a knowledge of their vulgarity, and many of them are forgotten almost as easily as they are coined.

AMERICAN RIVER, in N. central California, is formed by the union of its N. and S. forks near the W. boundary of El Dorado county, 30 miles above Sacramento city, flows S. W. between the counties of Placer and Sacramento, and falls into Sacramento river near that city. The N. fork, considered by some as the true American river, rises among the hills at the base of the Sierra Nevada, and flows W. S. W., forming the boundaries between Placer and El Dorado counties for 100 miles. The S. fork flows from Bonpland lake through El Dorado county, and forms part of the division between the counties of Sacramento and El Dorado. These streams pass through one of the principal gold-mining districts.

AMERICAN WINES. From the first settlement of America, the vine attracted the attention of the colonists, and as early as 1565 wine was made from native grapes in Florida. The first vineyard in the British colonies was planted by the London company in Virginia in 1620, and in 1630 French vine-dressers were imported by them; but the enterprise failed. Wine was made in Virginia in 1647, and in 1651 premiums were offered for its production. Beverly mentions that prior to 1722 there were vineyards in that colony, producing 750 gallons per year. In 1664 governor Richard Nicolls of New York granted to Paul Richards the privilege of making and selling wine free of duty, as the first who entered upon its cultivation on a large scale. Beauchamp Plantagenet, in a description of New Albion in 1648, states that the English settlers in Uvedale, now Delaware, had vines running on mulberry and sassafras trees. He names four kinds of grapes: Toulouse muscat, sweet-scented, great fox, and thick grape. The first two, after five months, being boiled and salted and well fined, made a strong red sherry; the third, a light claret; the fourth, a white grape, which crept on the ground, made a pure, gold-colored wine. Tennis Pale, a Frenchman, made out of these four eight sorts of excellent wine; and his muscat after four months would intoxicate a man with the second draught. In 1683 William Penn tried to establish a vineyard near Philadelphia, but without success. A few years later, however, Mr. Tasker of Maryland, and Mr. Antill of Shrewsbury, N. J., seem to have succeeded somewhat better. In 1796 the French settlers in Illinois made 110 hogsheads of strong wine from native grapes. At Harmony, near Pittsburgh, a vineyard of 10 acres was planted by Frederick Rapp and his associates from Germany, and they continued to cultivate grapes and silk at their new colony of Harmony in Indiana. In 1790 a Swiss colony was founded in Jessamine county, Ky., to establish a vineyard, but failed, as they planted only foreign grapes. They removed to Vevay, Switzerland county, Ind., in 1801, there planted native vines, especially the Cape or Schuylkill muscatel, and had more success. After 40 years' experience, however, they seem to have become discouraged.—The wines and wine grapes of America may be divided into wines of the Atlantic coast and wines of the Pacific coast. They are so entirely distinct that they can hardly be compared. The wines of the first division resemble more those of Germany and France, containing more acid, more sprightliness, flavor, and bouquet; while the wines of the Pacific coast, especially California, contain but little acid, a good deal of spirit, and little flavor or bouquet, thus more nearly resembling the wines of Spain and southern Europe. The cause for this may be sought partly in the soil, but mostly in climatic influences. It is well known to wine makers that the grape must contain a certain amount of acid to develop bouquet during fermentation of the must and its transformation into wine; while the heat of the southern climate develops the largest amount of sugar in the fruit, the acids diminish. I. WINES OF THE ATLANTIC COAST. These may be divided into three distinct classes: 1, white or light-colored wines; 2, red or dark-colored wines; 3, wines resembling sherry. 1. *White Wines.* The Catawba grape was first introduced by Major Adlum of Georgetown, D. C., having been found by him in Maryland. It was first planted on an extensive scale by Nicholas Longworth, who may be called one of the founders of American grape culture. He leased parcels of unimproved land near Cincinnati to German settlers to plant with vines for one half the proceeds. In 1858 the whole number of acres planted in vines around that city, mostly Catawba, was estimated at 1,200, of which Mr. Longworth owned 120. The principal pioneers in the business there, and extensive wine makers, are Messrs. Werk, Buchanan, Mottier, Bogen, Rehfuss, and Thompson, all owners of large vineyards and extensive manufacturers of still and sparkling wines. At Hermann, Mo., the Catawba was introduced in 1846, and bore its first fruit in 1847, when excellent wine was made from it on a small scale. Shortly afterward it was also introduced into Illinois. In 1860 the Pleasant Valley wine company was formed at Hammondsport, Steuben county, N. Y., which also cultivates it largely. But it is more extensively cultivated on the shores of Lake Erie than anywhere else, where the soil on Kelly's Island and Put-in-Bay, and around Cleveland and Sandusky, seems to be well adapted to it. It makes a light-colored wine, sprightly and aromatic, which is perhaps better known and has been longer appreciated than any other wine in the country. It varies very much with the different locations, the wine of New York, northern Ohio, and northern Illinois containing less spirit, but a high flavor and a good deal of acid, while the wines of Missouri and further south are smoother, heavier, and less acid and astringent. Although the vine is very uncertain in its product, being much subject to disease, there is more Catawba wine consumed now than perhaps all other varieties together, both still and sparkling. It makes an excellent sparkling wine, which many connoisseurs prefer to the imported; and as a still wine it resembles the light Rhine and Moselle wines of Germany, though of course with a peculiar characteristic flavor. Average specific gravity of must, 80° Oechsli; acid, 5 per M. The Isabella is a native of South Carolina, and was first introduced in the north and brought to the notice of cultivators by Mrs. Isabella Gibbs. It has been nearly superseded by better sorts. Its wine is pale pink, light and somewhat flat, hardly ever met with now except as sparkling, for which it is well adapted, though in every respect inferior to Catawba. Sp. gr. of must, 65°; acid, 6. The Cassady originated in Philadelphia, in Mr. Cassady's dooryard. Wine fine straw color, good body and fine flavor, strongly resembling the wines of the Palatinate. It is not much cultivated. Sp. gr. of must, 90°; acid, 4. The Diana is a seedling of the Catawba, raised by Mrs. Diana Crehore, Boston. Its wine is seldom met with alone, as its flavor is too strong, and the must is mixed with other grapes. It has little value as a wine grape. The wine is pale straw color, less sprightly than Catawba, with strong foxy flavor. Sp. gr. 80°; acid, 4. The Goethe, Rogers's hybrid No. 1, originated by Mr. Rogers of Salem, Mass., is a hybrid between *labrusca* and *vinifera*. The wine is very pale, almost white, of a delicate muscatel flavor, sprightly and ethereal; a very fine light still wine, surpassing Catawba, and no doubt well adapted for sparkling wine, though of too recent origin to have had a fair trial. Sp. gr. of must, 80°; acid, 4. It is extensively raised at the west as a wine grape. The Lindley, Rogers's No. 9, is of the same origin as the last. The wine is somewhat heavier and stronger flavored, resembling Catawba in color and taste. It promises well. Sp. gr. 90°; acid, 5. The Massasoit, Rogers's No. 3, of the same origin. Wine straw color, fine flavor and body, superior to Catawba in every respect. Very promising, though but little wine has yet been made of it. Sp. gr. 95°; acid, 5. The Salem, Rogers's No. 22, of the same origin. Wine straw color, too aromatic to be pleasant, though of heavy body. Sp. gr. 92°; acid, 4. The Martha is a seedling from the Concord, and originated with Samuel Miller of Lebanon, Pa. It first fruited in 1863. Wine straw color, of good body, less sprightly and more foxy than Catawba at first, but improves greatly by age; and as the grape is very hardy and productive, succeeding everywhere, it may become one of the leading white wines of the country for general consumption. Sp. gr. 90°; acid, 4. The Maxatawney originated at Eagleville, Pa., in 1844. Wine very delicate and smooth, pale yellow, resembling Rhine wine in character; a fine wine, which will be appreciated as soon as it becomes better known. Sp. gr. 80°; acid, 4. The North Carolina seedling was produced by J. B. Garber, Columbia, Pa., from seed of the Isabella. Wine dark yellow, of fair body and good flavor, if pressed immediately; about equal to good Catawba, with more muscatel flavor. Sp. gr. 80°; acid, 5. The Iona was originated by Dr. C. W. Grant, of Iona Island, N. Y. Wine pale yellow, of good body and fine flavor, superior to Catawba. It is extensively raised as a wine grape in some parts of its native state, and were it not so uncertain, its wine would become one of our leading varieties. Sp. gr. 90°; acid, 5.—The above belong to the class of *labrusca*, or fox grapes. The following belong to the *æstivalis* class, destined to make the finest wines, white as well as red, yet produced in the United States. The precise history of the Delaware grape is unknown. It was first introduced to the public and disseminated from Delaware, Ohio. The wine is of a yellow color, fine flavor, and great body, resembling some of the finer Rhine wines, especially the Traminer of Germany; a very good still wine, though not so well adapted to the manufacture of sparkling. As the grape does not succeed everywhere, it will be confined to certain localities. Sp. gr. 100°; acid, 4. The Herbemont or Warren was, according to the best authorities, first cultivated by Mr. Neal, a farmer of Warren county, Ga., in 1800. In the early settlement of the country he found the vine in the woods, and transplanted it. Its productiveness and fine flavor attracted attention, and it spread over the state. Mr. Herbemont, of Columbia, S. C.,. a native of France and an enterprising grape grower, cultivated it largely, and thought it had been imported from France, and belonged to the *pineau* class—an opinion which some of our vintners yet entertain. It was named in honor of him Herbemont, or Herbemont's Madeira. It was by him sent to Mr. Longworth at Cincinnati, and from there introduced at Hermann, Mo., by Mr. Charles Teubner, in 1847. Mr. Herbemont made for many years a very superior wine from this grape, and reported a yield in one season of 1,500 gallons to the acre. It is now more and more appreciated as a superior wine grape for the west and south, on dry limestone soils. Its juice, if pressed before fermentation, makes a very delicate white wine, resembling the finer qualities of Rhine wine, more sprightly than any other grape, and consequently well adapted to the manufacture of sparkling wine. It is a true wine grape, without pulp, and very juicy; and after fermentation a fine red wine can be pressed from the skins, which contain the coloring matter. Sp. gr. 90°; acid, 5. The Louisiana was introduced into Missouri by Frederick Münch of Warren county, who received it from Mr. Théard of New Orleans about 1855. Mr. Théard was positive that it had been imported from France, but it is so nearly related to the Herbemont that a mistake may have occurred. Its wine is perhaps the best of its class we yet have in America, fully equalling the finest Rhine wine, of fine golden color, exquisite flavor, and great body, smooth and rich, but is yet very scarce and high-priced. It is a true cabinet wine. Sp. gr. 110°; acid, 5. The Rulander or St. Genevieve was first cultivated at St. Genevieve, Mo., by some of the French settlers. It was first brought to the notice of the vine growers at Hermann by Mr. Louis L. Koch of Golconda, Ill., under its present name of Rulander, and is now extensively cultivated there. Mr. Peter Weitzenecker, near St. Louis, also cultivated it at an early date, under the name of Rothelben. Its wine is of golden yellow color, sometimes having a brownish yellow tint, with great body and very fine flavor, standing midway between a choice hock and a sherry, having some of the characteristics of both. It was awarded the first premium as the best light-colored wine at Cincinnati, Ohio, in 1868, about 25 varieties of the choicest wines competing. Sp. gr. 110°; acid, 5. The Taylor or Bullitt originated with Judge Taylor of Kentucky. It is the only white wine grape belonging to the *cordifolia* class of which wine has yet been made. It makes a wine of a straw color, of fine flavor, closely resembling the German Riessling, heavy body, and very sprightly. Were the grape a surer crop than it has yet proved to be, it would be extensively cultivated. Sp. gr. of must, 100°; acid, 5½. 2. *Red Wines.* In the *labrusca* class of grapes the Concord takes the lead, as it will succeed anywhere, on any soil, and is healthy, hardy, and exceedingly productive. There is perhaps as much wine made from it as from the Catawba, and it is effectually and truly the poor man's wine, as it can be produced very cheaply, and has a peculiar enlivening and invigorating effect upon the system. For a light summer wine it has not its equal as yet, and ought to supplant all the cheap French clarets, as it is better, more wholesome, and can be made cheaper. It originated with Mr. Bull of Concord, Mass., about 1854, but was not fully appreciated at the east. In 1855 it was introduced into Missouri by George Husmann of Hermann, and also about the same time or somewhat later by Frederick Münch of Warren county. The first wine was made of it by George Husmann in the autumn of 1857. It found universal favor, and the wine spread rapidly over the western states. Now it is raised everywhere and has become the grape for the million. Its fruit and wine are much finer at the west than at the east. The wine, if fermented on the husks, varies from bright red to dark red, has a strong native flavor resembling strawberries, is slightly astringent, sprightly, and invigorating. If the grapes are pressed as soon as mashed, it makes a white or yellow wine, which is now coming into use as a substitute for Catawba. It also makes a very fine sparkling wine, and is largely manufactured into the latter variety. Sp. gr. 75°; acid, 5. The Creveling, Bloom, or Catawissa originated at or near Catawissa, Columbia county, Pa. It makes a claret wine of very fine flavor, without the foxiness of the Concord, and which finds more favor with Europeans than the Concord. It is but moderately productive, however, and, although a finer table grape than the Concord, will hardly become so popular as a wine grape. It has much of the *æstivalis* character, and may be a hybrid between *labrusca* and *æstivalis*. Sp. gr. 75°; acid, 5. The Hartford prolific is an old variety, raised by Mr. Steele of Hartford, Conn. Its wine is very light and foxy, otherwise resembling Concord in color and character, but hardly so good. It is but little cultivated as a wine grape, although it yields abundantly. Sp. gr. 70°; acid, 5. The Ives is an accidental seedling produced by Henry Ives, near Cincinnati, Ohio, whence it was disseminated all over the west. It is productive and hardy, but has been much overpraised. Its wine is a fair claret, with a less foxy flavor than the Hartford or Concord, of a dark color and a good deal of astringency, in quality midway between the Concord and Norton, as produced at the west. Sp. gr. 80°; acid, 6. Rogers's hybrid No. 2 originated with Mr. Rogers of Salem, Mass., and, though hardly thought worthy of a name at the east because of its late ripening, is valuable at the west, being productive and hardy, and producing a wine of a brilliant red color, fair body, and peculiar but agreeable flavor, very sprightly and refreshing. Sp. gr. 80°; acid, 5. The Wilder (Rogers's hybrid No. 4), of the same origin, is very productive, and makes a pleasant, light red wine, of not much character, but a good summer drink, generally preferred to Concord. Sp. gr. 78°; acid, 4. The Telegraph originated in a dooryard near Philadelphia, and was first disseminated by Major Freas of the "Germantown Telegraph." The vine is very productive, healthy, and hardy, and makes a fair wine, of claret character and agreeable flavor. Sp. gr. 80°; acid, 5. —Among red wine grapes of the *æstivalis* class, the Alvey or Hagar, introduced by Dr. Harvey of Hagerstown, Md., is one of the best grapes in quality, succeeding well in many parts of the south. Its wine resembles the finer Bordeaux wines in character and flavor, and, if the grape should prove adapted to extensive cultivation, would soon become very popular in the market. Sp. gr. 90°; acid, 5. The Cynthiana was introduced to general culture by George Husmann of Hermann, Mo. It is supposed to have originated in Arkansas; hence its synonyme, Red River. Cuttings were received from William R. Prince of Flushing, N. Y., about 1858. The vine closely resembles Norton's Virginia, but the fruit is sweeter and more juicy, and the wine of an entirely different character, resembling the choicest Burgundy, very dark, of great body, and an exquisite spicy flavor. It is one of the best, if not the best of American red wines, and may safely enter the lists with the best brands of Burgundy; while the hardiness and productiveness of the vine makes it well adapted to general cultivation. Sp. gr. 130°; acid, 4. The Devereaux is a southern grape, closely related to the Herbemont. It is very uncertain in its crop, but makes a splendid dark red wine of the Burgundy class, the only rival to the wine of the Cynthiana now produced, and perhaps surpassing it in smoothness and delicacy, though not as aromatic and spicy. Sp. gr. 105°; acid, 4. Norton's Virginia (erroneously called Norton's seedling) was introduced by Dr. Norton of Richmond, Va., and was found by him on an island in the James river. It was first popularized by the grape growers of Hermann, where it was introduced about 1850 by Mr. Heinrichs of Cincinnati, and Dr. Kehr from Wheeling, Va. After a long and patient trial, it has gradually spread over the west to such an extent that its wine is known and made everywhere, and recognized as the best medical wine of America. It is dark red, almost black, very heavy, astringent, and of strong flavor, somewhat resembling the flavor of green coffee. It is a remedy against bowel complaints, chronic diarrhœas, and summer complaints in children, and as such will hardly be equalled by any other wine, either of Europe or America. It is also a preventive of intermittent fevers and other malarious diseases, and has already been appreciated in Europe as one of the best red wines of the world. Sp. gr. 110°; acid, 4.—Of the *cordifolia* class, the Clinton originated in New York about 1832. It is extensively planted, and a good deal of wine is made from it, especially in the northern states; but it is a very rampant grower, and much subject to the attacks of the gall louse. It makes a good dark heavy claret, if the grapes are well ripened, with rather a pleasant wintergreen flavor, liked by some. Sp. gr. 90°; acid, 6. The Franklin, probably a seedling of the foregoing, is very productive and hardy, and produces wine of similar character but inferior to Clinton. Sp. gr. 80°; acid, 6. The Marion, belonging to the same class, makes a fair red wine, but is hardly worth cultivating when better varieties are abundant. Sp. gr. 83°; acid, 6. 3. *Sherry Wines.* The Cunningham originated in the garden of Mr. Jacob Cunningham, Prince Edward county, Va., about 1812, and proved so thrifty and hardy that it covered an arbor 50 feet long and 12 feet high. Mr. Samuel Venable then cultivated it to a certain extent in his vineyard in Prince Edward, and was probably the first who made wine from it, very much resembling Madeira. It is now largely cultivated at Hermann and Bluffton, Mo. Its wine is brownish yellow, of great body, and fine, sherry-like flavor; and as the vine is a rampant grower and abundant bearer, it would be a favorite grape were it not somewhat tender, and only adapted to dry hillsides. Sp. gr. 100°; acid, 6. The Hermann originated with Francis Langendörfer, near Hermann, Mo., and first fruited in 1865. It is a seedling of Norton's Virginia, exceedingly hardy, healthy, and productive. It may be too late for extreme northern localities, but is certainly one of the most profitable varieties for the west and south. The wine, if properly handled, is of a brownish golden color, with true sherry flavor, very heavy, and exceedingly fragrant and spicy. Connoisseurs have preferred it to the finest imported sherries. Sp. gr. 105°; acid 4.—*Wines of the Southern Atlantic States.* There are two species of the vine exclusively confined to the southern states, which will not succeed north of the Potomac, and on the value of which for wine authorities still differ. 1. *Vitis vulpinia* or *rotundifolia* (the muscadine or Bullace). To this species may be referred the Scuppernong, and its seedlings, the Thomas, Flowers, and Mish. The vine is entirely different from any other species, the bark being smooth, the leaves round and glossy, and the fruit produced in clusters of from three to twelve berries, which drop from the stem when fully ripe. As wine has generally been made at the south so far by an addition of sugar and even alcohol, it is very difficult to judge of its true merits. One of the best wines is made by Germans at Aiken, S. C., where there are very extensive vineyards. The white Scuppernong seems to be deficient in sugar, as its must seldom ranges above 60°; and to contain so much gluten that it is very sluggish in fermentation. But although most of the must, even now, has sugar or alcohol added to it in fermentation, it seems that a good still and also sparkling wine may be made of it; and as the grape produces abundantly, and is very healthy, it may become a great source of profit to the south. Its wine is generally pale yellow, of strong flavor and heavy body, and the vines are said to produce after the 10th year from 750 to 1,500 gallons to the acre. Sp. gr. 60°; acid, 4. 2. *Vitis mustangensis*, or mustang grape. This is found in great abundance in the woods of Texas, where it climbs to the tops of the highest trees. So far as known, no attempts have been made to cultivate it. The berry is large, black or purple, and contains a very acrid juice. It is said to produce a wine resembling claret, and considerable quantities are made from the wild vines every autumn. II. Wines of the Pacific Coast. "The history of grape culture in California," says Charles Reukl in his work "California," "takes its rise in the southern districts of the state. The vine was introduced in the middle of the last century by the Catholic missions. The pious monks had brought their native thirst from the sunny fields of Spain, and longed to quench it in California. They began by sending for large numbers of Spanish and French cuttings, which, however, were found not to thrive when planted. They grew, but bore little fruit, and only at intervals. A ship which brought the monks their regular supplies once had some fine raisins on board. One of the missionaries planted the seeds, and the experiment succeeded; the vines flourished to admiration, and bore superb grapes. Large plantations were then made, with the aid of the Indians, at the mission of San Gabriel, in Los Angeles county." The grape originally planted by the missionaries is called Los Angeles, and was the only one cultivated in California to the year 1820. At that date a new variety was introduced in the Sonoma valley, believed to have been brought from Madeira. This new variety, and the old one of the missionaries of Los Angeles, are known as mission grapes, or California grapes, and still constitute two thirds of all the vines grown in the state. New varieties, however, have been introduced, partly from Europe, especially Germany, and partly from the Atlantic states. At the present day some 200 kinds of grapes are raised and tried in California, all of which seem to succeed. Those most frequently met with are: of European or Asiatic origin, the Riessling, Tokay, muscatel, black Hamburg, Chasselas; of American origin, Catawba, Isabella, Concord, Ives, Herbemont, Delaware, Diana, Salem, and many others. The intelligent and workmanlike culture of the vine, and the management and sale of its products, are of recent date. The long experience of other countries is still wanting there, so that many and grave difficulties are encountered. For some time the vine was usually planted in level river bottoms, and even on wide plains, and the vines were supposed to require artificial irrigation. It is now ascertained that the vines planted on the slopes of hills, as is usual in Germany and France, succeed far better than the vineyards on open plains, and produce wine generally heavier and of finer flavor. The largest vineyard in California is that of the

Buena Vista company in the Sonoma valley, which contains 450 acres and 306,000 vines. The same valley, which is very beautiful, sheltered against the winds, and free from fog, also contains the Rhine farm, laid out by Mr. Jacob Gundlach, in company with Mr. Emil Dresel. Gen. B. D. Wilson of San Gabriel has also 260 acres in vines. The total number of vines growing in California at the opening of 1870 was 22,548,315. The counties most actively engaged in grape-growing are Los Angeles, 4,000,000 vines in 1870; Sonoma, 3,250,000; Sacramento, 1,718,914; Amador, 1,683,000; El Dorado, 1,357,895; Solano, 1,128,000; Santa Clara, 1,000,000. In 1868, 2,676,550 gallons of wine and 161,015 of brandy were produced. According to local authorities, the wine yield of the state for 1870 was from 4,000,000 to 5,000,000 gallons, although the federal census of that year gives only 1,814,656. The "Wine Dealers' Gazette" estimates the produce of 1871 at 5,000,000; others place it as high as 7,000,000 or 8,000,000. The aggregate value of the vintage of California, including $400,000 as the cash value of grapes marketed for other purposes than wine making, may be put down at $2,500,000. The kinds of wines produced in California are as follows: 1. *White Wines.* The California Hock is of a bright straw color, somewhat variable in bouquet and quality, according to the place of growth, varieties of grapes used, and the skill of the producer; but it is generally far stronger, more fiery and apt to intoxicate the unwary than the Rhine wine. It is smoother, but has little of the exquisite bouquet of the Rhine wines, and their enlivening and exhilarating qualities. Of all the wines of California, this is most consumed in the Atlantic states, and is sometimes sold as Rhine wine. The Port, principally raised in Los Angeles, is dark red, strong and sweet, very probably made so by the addition of sugar and alcohol, like its European namesake. Angelica is a sweet wine, a favorite among ladies. It is not a pure wine, as alcohol, distilled from grapes, is added to it, and it is therefore a much stronger wine than many suppose. Madeira, sherry, muscatel, and claret are all made, but only in smaller quantities, and not highly esteemed. 2. *Sparkling Wines.* The brothers Sansevain first undertook to make sparkling wines in 1837, but without success. They and some others who turned their attention to the subject suffered great loss in numerous experiments, which resulted at last, however, in making a good sparkling wine from the grapes of California. The Buena Vista company have pursued this enterprise with great success since 1863, and Isidor Landsberger and company prepare monthly between 800 and 1,000 bottles. It is rather too heavy in body, however, and lacks the sprightliness and ethereal qualities of the best imported French and German sparkling wines, as also of the sparkling Catawbas, Concords, and other varieties made in the Atlantic states. The prices of the California wines fluctuate a good deal, but it is perhaps the only country where wine at its place of production is cheaper than milk. In August, 1869, a gallon of ordinary wine brought 30 cts. at Anaheim and Los Angeles, while a gallon of milk cost 50 cts. —The wines of New Mexico resemble those of California very much in character, but are rarely in the market. This may partly be accounted for by the isolated position and inaccessibility of the country, partly by the indolence of the manufacturers. During the last few years grape culture has attracted a good deal of attention in Oregon, and it seems both native and foreign varieties thrive there equally well.—It is difficult to give even an approximate statement of the amount of the wine interest in the United States. There are hardly any trustworthy statistics to be gathered, as the manufacture is spread over so vast a territory, of which many portions are yet but thinly inhabited. The following statistics are mostly derived from private sources, and should only be taken as approximate:

	Gallons.		Gallons.
California	5,000,000	Wisconsin	25,000
Ohio	3,500,000	Maryland	25,000
New York	3,000,000	South Carolina	25,000
Missouri	2,500,000	Alabama	20,000
Illinois	2,500,000	Connecticut	20,000
Pennsylvania	2,000,000	Mississippi	15,000
Iowa	400,000	Tennessee	15,000
Kentucky	300,000	Arkansas	15,000
Kansas	200,000	Georgia	15,000
Indiana	150,000	Louisiana	10,000
North Carolina	40,000	Delaware	5,000
Michigan	40,000	Dist. of Columbia	5,000
West Virginia	35,000	Massachusetts	5,000
Virginia	30,000	Nebraska	5,000
Texas	30,000	Oregon	5,000
New Mexico	30,000	Washington Ter.	5,000
New Jersey	25,000	Other States and Ter.	5,000
Total			20,000,000

Of this amount 5,040,000 gallons would come from the Pacific and 14,060,000, from the Atlantic coast. The varieties of the Atlantic states, and their approximate value from the producer to the dealer, may be estimated as follows:

	Gallons.	Price.	Value.
Catawba	6,000,000	$0 75	$4,500,000
Concord	4,000,000	0 50	2,000,000
Norton's Virginia	1,000,000	1 00	1,000,000
Delaware	1,000,000	1 25	1,250,000
Clinton	1,000,000	0 75	750,000
Isabella	500,000	0 50	250,000
Ives	500,000	0 75	375,000
Herbemont	250,000	1 25	312,500
Scuppernong	100,000	1 00	100,000
Other varieties	610,000	1 00	610,000
Total	14,060,000		$11,147,500

To this may be added:

For grapes consumed	$5,000,000
For grape vines and grape wood	5,000,000
For brandy distilled from grapes, husks, and lees	1,000,000
Total product of vineyards of the Atlantic States	$22,147,500

If the fact is taken into account that grape culture has really assumed importance only within the last 10 years, it may safely be predicted that it will be trebled within the next 25 years, and become a vast source of national wealth.

AMERIGO VESPUCCI. See Vespucci.

AMERSFOORT, a town of the Netherlands, in the province of Utrecht, with a port on the river Eem, about 10 m. from its mouth in the Zuyder-Zee, and 12 m. E. N. E. of Utrecht; pop. in 1867, 13,258, nearly half Roman Catholics. It has manufactories of cotton and woollen stuffs, an industrial school, a Latin school, and a Jansenist seminary. Corn and tobacco are cultivated very extensively in the vicinity, and a brisk trade is carried on.

AMES, Edward R., D. D., an American clergyman, bishop of the Methodist Episcopal church, born at Amesville, Ohio, May 20, 1806. In 1826 he entered the Ohio university at Athens, and in 1828 opened a high school at Lebanon, Ill., which was the germ of McKendree college. After remaining here until 1830, he entered the itinerant ministry as a member of the Indiana conference. Being one of the delegates to the general conference of 1840, he was elected corresponding secretary of the missionary society for the south and west. From 1844 to 1852 he was a presiding elder in the Indiana conference, and was then elected bishop. He was the first Methodist bishop to visit the Pacific coast. During the civil war he served on several important commissions. Since 1861 he has resided in Baltimore.

AMES, Fisher, an American orator, statesman, and political writer, born in Dedham, Mass., April 9, 1758, died there, July 4, 1808. His father, who was a physician, died when the son was but 6 years old, but his loss was in some degree supplied by the energy and good sense of his widow. Fisher graduated at Harvard college at the age of 16. His youth, the disturbed state of public affairs, and the narrowness of the family means, delayed for several years his entrance into the profession of the law. During this interval, however, he was busily educating himself by the study of the Latin and English classics. In 1781 he was admitted to the bar, and began practice in his native town. But it was his political essays in the Boston newspapers, under the signatures of Brutus and Camillus, that first made his abilities generally known. When their authorship was discovered, he entered into private and political intimacy with the leading men of his own state and elsewhere, who were afterward the prominent federalists of the Washington school. He was a member of the Massachusetts convention assembled in 1788 for ratifying the federal constitution, and made himself conspicuous by the zeal and eloquence with which he recommended its adoption. When the federal government went into operation, Mr. Ames was elected the first representative of his district, which then included Boston, in congress, and kept his seat during the eight years of Washington's administration. His readiness in debate and the splendor of his set speeches place him in the very first rank of parliamentary orators. At the close of his speech advocating the appropriation required for the execution of Jay's treaty with Great Britain, a member of the opposite party moved an adjournment, on the ground that the house was not in a state of mind to dwell calmly on the question when fresh from the excitement of its eloquence. At the close of his fourth term Mr. Ames left congress and returned to his profession. His interest in public affairs at that most excited period was manifested by fresh essays in the newspapers; but he took no immediate part in politics and accepted no office, excepting that of executive councillor under the administration of Governor Sumner. On the death of Washington he pronounced his eulogy before the legislature of Massachusetts. The gradual failure of his health compelled him soon to withdraw from the active practice of his profession, and he spent the last years of his life in philosophic retirement. He was married in 1792 to Frances, daughter of John Worthington of Springfield, and in the occupations of domestic life, the superintendence of his farm and orchards, the study of literature, and the society of a brilliant circle of friends, his life wore away peacefully and happily. The chief drawback to his satisfaction was found in the gloomy forebodings as to the future of his country and the success of the experiment of republican government, which he felt in common with most of his school of politics. His works were collected and published in one volume soon after his death, with a memoir written by the Rev. John Thornton Kirkland. An enlarged edition, in two volumes, appeared in 1854, edited by his son, Mr. Seth Ames, of Cambridge, Mass. The first volume of this edition is composed of his letters, and they add to his former reputation that of one of the liveliest, wittiest, and most graceful of letter-writers. His orations, essays, and letters are of the highest excellence in their several departments, although the exuberance of his imagination, displayed in the multitude and splendor of his metaphors and illustrations, is sometimes perhaps a little excessive, notwithstanding their felicity and appositeness. His appearance was attractive, his manners gentle and prepossessing, the play of his wit and imagination brilliant and incessant. Many of his *bons mots* have passed into proverbs.

AMES, Joseph, an American portrait painter, born in Roxbury, N. H., about 1825, died Oct. 30, 1872. He practised his art many years in Boston. Among his chief works are portraits of Pius IX., Rachel, Daniel Webster, Rufus Choate, and President Felton of Harvard college. His "Death of Webster," a large composition containing a number of figures, has been engraved.

AMES, Joseph, an English antiquary, born in Yarmouth, Jan. 23, 1689, died Oct. 7, 1759. He was a ship chandler or an ironmonger in Wapping, London, and wrote a work entitled "Typographical Antiquities, being an Historical Account of Printing in England, with some Memoirs of our Ancient Printers." It was a valuable compilation, and made more so by the subsequent additions of Herbert and Dr. Dibdin. He was the author of some other antiquarian works, was a fellow of the royal society, and secretary of the antiquarian society from 1741 till his death.

AMES, William, D. D., an English Independent divine, born in Norfolk county in 1576, died in Rotterdam in November, 1633. He was educated at Christ's college, Cambridge, of which he became a fellow. In the reign of James I. he left the university in order to avoid expulsion for nonconformity, and retired to the Hague, where he became minister of an English church. Subsequently he filled for twelve years the chair of divinity of the university of Franeker. He then removed to Rotterdam, and intended to emigrate to New England, but this design was frustrated by his death. His widow and children, however, did sail for America. He left many controversial writings against the Arminians and others, and his *Medulla Theologiæ* was famous in its day.

AMESBURY, a town of Essex county, Mass., about 40 m. N. of Boston, and 6 m. N. W. of Newburyport, extending from the N. bank of the Merrimack river to the New Hampshire line; pop. in 1870, 5,581. A branch of the Eastern railroad extends from Salisbury to this point. Manufacturing is extensively pursued. The town contains 5 woollen mills, with 46 sets of machinery, using annually $1,257,500 worth of stock, and employing 270 males and 372 females; 1 brickyard, 2 manufactories of hats and caps, 18 of carriages, 1 of carriage wheels, 3 of harnesses, 3 saw mills, and 21 blacksmith shops. There are several churches, good schools, and a weekly newspaper. It is the home of the poet John G. Whittier, who is frequently called the bard of Amesbury. Josiah Bartlett, M. D., one of the signers of the declaration of independence, was born here in 1729.

AMETHYST (Gr. ἀμέθυστος, preventing intoxication, so named because it was supposed by the ancient Persians that cups made of it would prevent the liquor they contained from intoxicating), a stone consisting of crystallized quartz of a purple or bluish violet color, probably derived from a very small amount of oxide of manganese or, according to Heintz, from a compound of iron and soda. The color is not always uniformly diffused through it, and is less brilliant by candlelight. The name was used by the ancients for several other minerals, which had a color similar to the amethyst. In mineralogy, amethyst is that variety of quartz that exhibits a wrinkled fracture, instead of the usual conchoidal one.—For oriental amethyst, see SAPPHIRE.

AMGA, a river in Siberia, which rises in the Yablonnoy mountain range, flows in a N. N. E. direction nearly 460 m., and falls into the Aldan, the principal eastern affluent of the Lena. At its passage through the village of Amginsk, where it is bounded on each side by steep rocks upward of 30 feet in height, it attains a breadth of 3,000 feet.

AMHARIC LANGUAGE, the language of Amhara, the largest division of Abyssinia, including all that portion which lies between the Blue Nile and the Tacazze rivers, and having Lake Tzana in the centre. It is spoken with some variations of dialect throughout Abyssinia, and a knowledge of it is therefore essential to an Abyssinian traveller. It is of ancient Semitic origin, and related to the old Ethiopian or Geez, which it superseded in the early part of the 14th century as the language of the court, and gradually also as the popular idiom. It resembles, however, the Geez much less than does the Tigré, the dialect of the northern province of Abyssinia, being to a great degree corrupted by non-Semitic African admixtures, and stinted in its grammatical forms. Its alphabet is the Geez, slightly modified. (See ETHIOPIAN LANGUAGE.) Very little is known of the Amharic language, though the British and Foreign Bible society have published first the New Testament (1829) and later the whole Bible in that tongue.

AMHERST, a W. central county of Virginia, bounded S. E. and S. W. by the James river, and N. W. by the Blue Ridge; area, 418 sq. m.; pop. in 1870, 14,900, of whom 6,704 were colored. It abounds in fine scenery, of which the passage of the James river through the Blue Ridge is specially noted. Its soil is fertile, and largely covered with forests and plantations. The productions in 1870 were 75,065 bushels of wheat, 160,655 of corn, 117,608 of oats, 1,285,471 lbs. of tobacco, and 109,778 of butter. The Washington City, Virginia Midland, and Great Southern railroads pass through the county. Capital, Amherst Court House.

AMHERST, a town of Hampshire county, Mass., 82 m. W. of Boston, on a branch of the Connecticut river; pop. in 1870, 4,035. The situation of the town affords extensive views of the Connecticut valley and adjacent mountain ranges. It contains 5 Congregational churches, 1 Baptist, and 1 Episcopal. The preparatory high school is considered one of the best in the state. There are 4 paper mills, an establishment for the preparation of palm leaf for hats, bonnets, &c., and one for their manufacture. A weekly newspaper, and a semi-monthly periodical are published in the town. The Massachusetts agricultural college, with its extensive dormitories and greenhouses, is about a mile N. of the town, and possesses with other objects of interest the Durfee plant house, which is well stocked with rare and beautiful plants. Since its opening in 1866 this institution has become the largest and most successful agricultural school in the country. Amherst college, one of the chief seats of learning in New England, was founded in this town in 1821, under the auspices of the Orthodox Congregationalists. Its projectors had in view the gratuitous education of young men for the ministry, and the charity fund devoted exclusively to this object now amounts to about $70,000. There is a large number of scholarships available to needy students, and no earnest young man is allowed to leave for want of money. This fund now amounts to $100,000. The Rev. Zephaniah Swift Moore was the first president of the college. He died in 1823, and was succeeded by the Rev. Heman Humphrey, who retained the office till 1845, and performed important services to the institution, having safely carried it through the most perplexing embarrassments. The Rev. Edward Hitchcock followed him, and resigned in 1854, when the present incumbent, the Rev. William A. Stearns, D. D., LL. D., was inaugurated. The managers of the institution had to struggle against many discouragements at the outset, and not a dollar was appropriated in its aid from the state treasury during the first 25 years of its existence. The state appropriations to the present time amount to $52,500, a portion of which was for the endowment of the "Massachusetts Professorship of Natural History." The college has received many munificent donations from individuals. Dr. William J. Walker, a resident of Charlestown, Mass., and a graduate of Harvard college, besides giving to the institution during the latter years of his life upward of $90,000 toward the erection of a building for scientific purposes, and founding a professorship of mathematics and astronomy, left a legacy for similar purposes of nearly $150,000. The next largest giver is Samuel A. Hitchcock of Brimfield, who has contributed to the college $175,000. The donations of the Hon. Samuel Williston, an eminent manufacturer in Easthampton, Mass., who has long been one of the most ardent friends of the institution, amount to about $150,000. The funds for the college church recently erected were given by W. F. Stearns, son of the president of the college. Amherst college has 12 public buildings besides the president's house, including an edifice for scientific and other purposes recently built at the cost of more than $120,000, and a church for such as do not prefer to worship with other denominations. In the tower is a chime of bells, presented by the late George Howe of Boston, and beneath it a small room for tablets in commemoration of the young men who fell in the war. A gallery of art has been started. In 1847 a handsome edifice was erected to be employed as a cabinet of natural history and an astronomical observatory, chiefly by the efforts of the Hon. J. B. Woods of Enfield. The library, a fine building, was constructed in 1853, of Pelham granite. The college possesses a valuable philosophical and astronomical apparatus, an extensive geological and conchological museum, collections of meteorites and geological specimens, a Nineveh gallery containing about 200 specimens from the ruins of ancient Nineveh and Babylon, a museum of Indian relics, and the Hitchcock ichnological collection. In this unique cabinet, named after the late President Hitchcock, are to be found about 1,400 specimens, containing at least 20,000 tracks of animals in stone, together with plaster and clay casts of tracks of living and fossil animals. There is in the curriculum a regular department of physical training, under the care of a physician. There are 13 professors and 8 lecturers and instructors. The libraries of the college and various literary societies contain about 36,000 volumes. The number of under graduates is 244. In 1869 the whole number of graduates was 1,829, of whom 1,449 survived. Of the whole number, 751 became clergymen, 75 missionaries, 129 physicians, 186 lawyers, and 208 teachers.

AMHERST, a town of British Burmah, in lat. 16° 5′ N., lon. 97° 25′ E., on a triangular peninsula N. E. of the gulf of Martaban, 30 m. S. of Maulmain; pop. increased from 5,000 in 1838 to 20,000 in 1853, but since largely reduced. It was founded by the English in 1826, and rapidly increased in population and prosperity, but has been superseded by Maulmain, of which it now constitutes an outer port and a station for pilots. The harbor is spacious and secure, but the bar across its entrance is dangerous. The military cantonments are on an elevation 1½ m. outside of the town. It is a resort of invalids from Maulmain, owing to its salubrious climate.

AMHERST. I. Jeffery, baron, an English general, born in Kent, Jan. 29, 1717, died Aug. 3, 1797. He entered the army at the age of 14, was present at Dettingen and Fontenoy on the staff of Gen. Ligonier, and in 1758 was sent to America with the rank of major general. In conjunction with Wolfe and Prideaux, he made the entire conquest of the French strongholds in Canada, for which he received the thanks of the house of commons and the order of the Bath. He was soon afterward appointed commander-in-chief of the British forces in America. In 1763 he was appointed governor of Virginia, and in 1770 governor of the island of Guernsey. He was commander-in-chief of the army 1772–'82, and again 1793–'5, when he was superseded by the duke of York, and was soon afterward made a field marshal. In 1776 he was elevated to the peerage, with the title of Baron Amherst of Holmesdale; and in 1787 he received a patent as Baron Amherst of Montreal. **II. William Pitt,** earl, and Viscount Holmesdale, a British statesman, nephew of the preceding, born Jan. 14, 1773, died March 13, 1857. He was British ambassador in China, and succeeded Hastings as governor general of India (1823–'7). Under his administration the Burman war resulted in an important accession of British territory, and his services were rewarded with an earldom in 1826.

AMIANTHUS. See ASBESTUS.

AMICE, or **Amict** (Lat. *amictus*, girt around), a vestment worn by priests in the Roman Catholic church during the celebration of mass. It consists of a square linen cloth tied over the neck and shoulders, and was originally used as a protection for the throat. After the general adoption of the cravat had rendered the amice unnecessary as a neckcloth, it was retained for the significance which it had acquired as an emblem of the cloth wherewith the Saviour was blindfolded by the Jews the night before his crucifixion.

AMICI, Giovanni Battista, an Italian optician and astronomer, born in Modena, March 25, 1784, died in Florence, April 10, 1863. He became eminent at an early age for his mathematical and general scientific attainments, and directed for upward of 30 years the Florence observatory. He also lectured on astronomy, and was a member of almost all the learned academies of Europe. Science is especially indebted to him for his improvement of the telescope, of several microscopes, and of the camera lucida, invented by Hooke and Wollaston. In 1827 he made dioptric microscopes, which are sold with his name attached, and, notwithstanding the improved microscopes of Oberhäuser, are still in great favor. He was assisted in his labors by his son VINCENZO, who is professor of mathematics at the university of Pisa.

AMIDAS, Philip, an English discoverer, born in Hull in 1550, of a Breton family, members of which had been for nearly a generation domesticated in England, died about 1618. He commanded one of the two ships composing the first expedition sent by Queen Elizabeth under Arthur Barlow to North America. They touched at the Canaries, the West Indies, and Florida, and then made their way northward along the coast. On July 13, 1584, they entered Ocracoke inlet, and landed on Wococken island. Barren and desolate as this part of North Carolina now is, the mariner thought it beautiful, and gave gorgeous descriptions of it. The people of the country were kind and gentle, and the scenery was lovely and luxuriant. On the return of Amidas and Barlow to England they reported their discoveries to Raleigh, who does not appear ever to have been on the North American continent, and from him the matter was imparted to Queen Elizabeth, who called the new land "Virginia." Amidas was long after in the English maritime service, and went in charge of an expedition to Newfoundland a few years later. He died in England a few months before Raleigh's execution.

AMIENS, a town of France, capital of the department of Somme, 70 m. N. of Paris, on the Somme, which is navigable for small craft; pop. in 1866, 61,063. The old ramparts have been converted into fine boulevards and promenades. The citadel is the only remnant of the former fortifications. Of the ancient castle nothing remains but the crypt, which is associated with the tradition of St. Firmin's martyrdom. The cathedral, one of the largest and finest Gothic edifices in Europe, is remarkable for the splendor of its interior. Amiens has an academy, a lyceum, and a public library. In the place St. Michel is a statue of Peter the Hermit, who was born here. Amiens has been the centre of the French cotton industry since the last century. The cotton velvet factories employ 400 looms, and the other manufactories over 8,000. The annual consumption of wool is estimated at 100,000,000 lbs.—Amiens was the Samarobriva of the Romans, the present name being traced to the Ambiani, the early Gallic inhabitants. In the middle ages it was the centre of a district then called the Amiénois, and ruled by bishops of the town. At the end of the 12th century it was united to the French crown. Subsequently it was ruled by the dukes of Burgundy, but it reverted to the crown under Louis XI. The Spaniards, who captured Amiens in 1597, were speedily dislodged by Henry IV. with the aid of English troops. The treaty of Amiens, establishing peace between England, France, Spain, and the Batavian republic, was signed in 1802. During the Franco-German war the town was occupied for some time by the Germans, after a decisive victory won over the French in the vicinity, Nov. 27, 1870.

AMIOT, or **Amyot, Joseph,** a French Jesuit and missionary to China, born in Toulon in 1718, died in Peking in 1794. He was early distinguished for great scientific attainments and indefatigable industry. In 1750 he was sent to China, and after some stay at Macao was called by the emperor Kien-lung to Peking, which he reached Aug. 22, 1751, and never afterward left. Devoting himself to the study of the antiquities, history, languages, and arts of the Chinese and Mantchus, he annually sent to France memoirs, treatises, and translations which greatly extended European knowledge on these subjects. Among his works published separately were: *Éloge de la ville de Moukden*, a translation of a poem by the emperor Kien-lung, with numerous notes (1770); *Art militaire des Chinois* (translation, 1772); and *Dictionnaire tatar-mantchou-français* (3 vols. 4to, 1789), which was edited by Langlès, and the types for which were cut and cast at the expense of the minister Bertin. But the greater part of his writings were included in the *Mémoires concernant l'histoire, les sciences et les arts des Chinois* (15 vols. 4to). The list of his contributions to the first 10 volumes of this work occupies 14 columns of the table of contents. His treatise on Chinese music fills most of vol. iv., and his life of Confucius nearly all of vol. xii. In vol. xiii. there is a brief Mantchoo grammar by him.

AMITE, a river rising in S. W. Mississippi, passes into Louisiana, and reaches Ascension parish by a southerly course; it then turns and flows S. E. and E. to Lake Maurepas. It is navigable by small steamboats for a distance of 60 miles.

AMITE, a S. W. county of Mississippi, bordering on Louisiana, named from the Amite river, which flows through its centre, and bounded on the N. W. corner by the river Homochito; pop. in 1870, 10,973, of whom 6,777 were colored. The area was 700 sq. m., but a portion of its territory was taken in 1870 to form the new county of Lincoln. The county is mainly occupied by cotton fields and forests; its surface is somewhat uneven. The soil is fertile. The productions in 1870 were 254,784 bushels of corn, 53,702 of sweet potatoes, 11,233 lbs. of rice, and 17,456 bales of cotton. Capital, Liberty.

AMLWCH, a seaport town on the N. shore of the island of Anglesea, Wales, the terminus of the Chester and Holyhead railway; pop. in 1861, 5,949. The celebrated Parys copper mines, in its vicinity, which gave the town importance, have of late years greatly decreased in productiveness.

AMMAN. I. Johann Konrad, a Swiss physician, born at Schaffhausen in 1669, died at Warmund, near Leyden, about 1725. He studied at Basel, but established himself in Holland. In 1692 he published an essay entitled *Surdus Loquens* ("The Deaf Speaking"), in which he gave an account of the results of his successful efforts in teaching a girl deaf and dumb from birth to articulate. In 1700 he published another essay entitled *Dissertatio de Loquela.* These two works were of great value to Heinicke, Braidwood, and De l'Épée, who at a later period organized schools for the instruction of deaf mutes. He was also noted as an editor and translator of the classics. **II. Jost,** or **Jodocus,** a Swiss painter and engraver, born in Zürich in 1539, died in 1591. In 1560 he established himself at Nuremberg, where he acquired fame, especially by his woodcut illustrations of *Reineke Fuchs,* Luther's Bible, Schoppen's *Panoplia,* and many other works, being the best and most prolific illustrator of his time. His paintings are rare and much sought for.

AMMIANUS MARCELLINUS, a Roman soldier and historian, born in Antioch, of a Greek family, died about A. D. 395. In his youth he embraced the military profession, and served under Ursicinus, one of the most celebrated of the generals of Constantius. In 363 he accompanied the emperor Julian in his expedition against the Persians. He ultimately settled at Rome, and devoted his latter days to the composition of his history of the emperors from the accession of Nerva, A. D. 96, to the death of Valens in 378. It comprised 31 books, the first 13 of which are lost. The style is vicious and inflated, but the work is highly valuable as an authority.

AMMERGAU. See OBER-AMMERGAU.

AMMON, a deity extensively worshipped in ancient times in many countries of Africa and Europe. The Egyptians called him Amen or Amen-Ra (Ammon the Sun), the Hebrews Amon, the Greeks Zeus Ammon, and the Romans Jupiter Ammon. His most celebrated temples were at Thebes in Upper Egypt, in the Libyan oasis of Ammonium (now Siwah), and at Dodona in Greece. He was generally represented in the form of a ram, or as a human being with the head of a ram. This representation meant probably that Ammon stood in the same relation to men as the ram does to the flock; that he was the guide, governor, and protector of the people. The derivations of the name Amen are numerous, but none has as yet obtained general acceptance.

AMMON, Christoph Friedrich von, a German Protestant theologian and pulpit orator, born in Baireuth, Jan. 16, 1766, died in Dresden, May 21, 1850. He studied theology in Erlangen, in 1789 became professor of philosophy, and in 1792 professor of theology and preacher at that university. From 1794 to 1804 he was professor of the same branches in Göttingen, then until 1813 again in Erlangen, and from that time until his death Protestant court preacher, vice president of the consistory, and afterward member of the ministry of worship in Dresden. In 1825 he accepted the old title of nobility, which his family had lost in 1640, together with their feudal estates, on account of their fidelity to Protestantism, and which the king of Bavaria had in 1824 restored to them. Ammon was, together with Bretschneider, Paulus, Röhr, and other German theologians of minor mark, the father of what is known as German theological rationalism. In his principal work, "Development of Christianity into the Universal Religion" (*Fortbildung des Christenthums zur Weltreligion,* 4 vols., Leipsic, 1833–'40), he holds that the Christian religion is perfectible not only in its external form as a church, but also in its substance and nature, and must be further developed if it is to embrace the whole of humanity. He regards Jesus as a mere man, who attained the highest scope and elevation, and so became intimately united with God. Though he was among the first to introduce the Kantian philosophy into theology, and to lay a great stress on the use of reason in matters of revealed religion, he was no systematic and comprehensive thinker. Nice distinctions being at that time drawn among the rationalists between rational supernaturalism and supernatural rationalism, he called himself a follower of the latter school, according to which belief or faith begins where science ends, and revelation may make up for the deficiencies of reason. This position being too much exposed to objections from the side both of believers and unbelievers, he was sometimes, as for instance by Schleiermacher in the dispute on "Harms's Theses," charged with duplicity; and his last great work, "The Life of Jesus" (2 vols., Leipsic, 1842–'4), was even ridiculed on account of its undecided position in regard to the later critical theories of Strauss, Bruno Bauer, Feuerbach, and the Tübingen school. Among his other writings we may mention particularly *Handbuch der christlichen Sittenlehre* (3 vols., Leipsic, 1823; 2d ed., 1838); *Anleitung zur Kanzelberedsamkeit* (3d ed., Erlangen, 1826), more naturalistic in the 1st and 3d, more supernaturalistic in the 2d edition; *Entwurf einer reinbiblischen Theologie* (2d ed., 3 vols., Göttingen, 1801–'2); *Summa Theologiæ Christianæ* (4th ed., Leipsic, 1830); and his last work, *Die wahre und falsche Orthodoxie* (Leipsic, 1849). He had the misfortune to see the theological system which he represented entirely deserted by the great mass of his contemporaries, either for infidelity or for thoroughgoing orthodoxy and pietism. His biography is entitled *Ch. F. Ammon nach Leben, Ansichten und Wirken* (Leipsic, 1850).

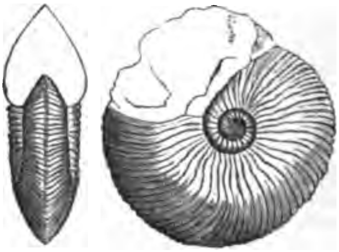
AMMONIA, volatile alkali. The origin of the word is uncertain; some authors suppose it to be from the god Ammon, near whose temple in Upper Egypt it was produced; others from Ammonia, a Cyrenaic territory; while others again derive the word from *ἄμμος*, sand, because the sal ammoniac (*τὸ ἀμμωνιαχόν*) was found in the sands of Africa. Pliny was probably acquainted with it; it was afterward discovered in 1677 by Kunckel, still later in 1756 by Dr. Black, and finally more fully described by Dr. Priestley in 1774. It is composed of one volume of nitrogen and three volumes of hydrogen, which on combination condense to two volumes. In its pure state, and at the ordinary temperature and pressure, it is a colorless, pungent gas, wholly irrespirable, not a supporter of combustion, excepting of bodies which readily combine with hydrogen, strongly alkaline, having a specific gravity of 0·59, and readily converted into a liquid by cold or pressure. The elastic force of the vapor of liquid ammonia at different temperatures, according to Bunsen, is as follows: at —33·7° C. = 1 atmosphere; at —5° C. =4 atmospheres; at 0° C. = 4·8; at +5° C. =5·6; at +10° C. = 6·5; at +15° C. = 7·6; at +20° C. = 8·8. Bunsen prepared the liquefied ammonia by causing the perfectly dry gas to pass through a column of hydrate of potash, and thence into a tube cooled to —40° C. The liquid ammonia is colorless, very mobile, having a specific gravity of 0·63. It freezes under a pressure of 20 atmospheres at —75° C., and at —87° C. in vacuo. This solid, frozen ammonia is a white, transparent, and crystalline body, possessed of a faint odor. Liquid ammonia is a powerful solvent for a number of metals, as has been recently (1871) shown by Professor Charles A. Seely of New York. Two important applications of liquid ammonia have been made in modern times. The first is its employment as a motive power according to the invention of a French chemist, M. Tellier; and the second is the invention of M. Carré to use it for the artificial production of cold. One gramme of water at 0° C. and 760 mm. pressure absorbs 0·877 gramme or 1,149 times its volume of ammonia gas; at 20° C. it absorbs 681 times its volume and yields the liquid ammonia of the shops.—Commercial ammonia was formerly obtained from the sal ammoniac of Africa; but this source is entirely inadequate to supply the present demand, and recourse has been had to numerous other sources. The greater part of the aqua ammoniæ of the shops is derived from the waste liquors of the manufactories of illuminating gas. The ammonia of the boracic acid works of Italy is also saved, and some establishments yield 3,300 lbs. of sulphate of ammonia every 24 hours, in addition to the boracic acid which is condensed in the water. Some of the crude crystals of borax contain nearly 4 per cent. of ammonia, and when these are fused with soda, the ammonia is driven out and can be condensed in suitable vessels. When caustic soda is mixed with Chili saltpetre, much ammonia is liberated, which can be condensed and saved. The ammonia arising from the beet in the manufacture of sugar and from the gas in coking furnaces is also economized to some extent. The preparation of ammonia for the arts is founded upon the action of quicklime upon a convenient ammoniacal salt. It is customary to distil an intimate mixture of one part of pulverized sal ammoniac with two parts of moistened lime, and to condense the gas in water. On a large scale ammonia is obtained directly from gas-house liquors, without being previously converted into sal ammoniac.—Ammonia is produced in the juices of various nitrogenous animal and vegetable substances in their putrefactive fermentation. It is given out in their decay, and, passing into the atmosphere, is condensed by the aqueous vapor, and returned to the earth in rain water, mists, and snow. It furnishes to plants the nitrogen they require, and is thus the principal valuable ingredient of the manures. Guano is a great repository of it. The shavings of horn have been used to prepare it, whence the name spirits of hartshorn. It is given out in the destructive distillation of all bituminous mineral matters, coming over in an impure state, condensed in the aqueous vapors, and mixed with the tarry products. This is the source from which it is now principally obtained for commercial purposes. It is also evolved from urine in a state of decomposition; and from this substance are prepared annually in Paris from 17,000 to 18,000 lbs. of ammoniacal salts. Refuse animal substances, as bones and horns, blood and hair, horse flesh, and rags of wool and silk, are made to yield a variety of ammoniacal salts—as the carbonate and acetate—by distilling them. The chief product is the subcarbonate of ammonia in solution. From the solid matters that will not distil over are obtained animal black, which is used for clarifying sugars, and a carbonaceous substance employed in the manufacture of Prussian blue. Sal ammoniac is prepared from the crude carbonate thus obtained in combination with the ammoniacal products of the gas works and other operations referred to. The liquors are saturated with muriatic acid and evaporated; the salt deposited is dried and then sublimed, by which means it is collected free from impurities. Ammonia yields numerous salts, some of which are employed in the arts. They are all readily destroyed by heat.—The water of ammonia, the carbonate, chloride, and acetate, are used in medicine; the first externally as an irritant or to develop the gas; the others internally. Their effect is to temporarily accelerate the heart's movements, by an action rather on the muscular than on the nervous apparatus, and to liquefy mucus where they come in contact with it, either directly as in the stomach and intestines, or in the way of elimination, as in the bronchial tubes. It leaves the system by the lungs, skin, and kidneys, having much less effect than the fixed alkalies in alkalizing the secretion of the latter organ. Carbonate of ammonia is used as a rapidly diffusible stimulant in various diseases, especially febrile and neuralgic, and sometimes as an expectorant, its action being twofold, strengthening the bronchial muscles and liquefying the mucus. The chloride, though it is less powerful as a stimulant, is used for similar purposes, and also in some affections of the digestive organs. The *liquor ammoniæ acetatis* or *spiritus Mindereri* is, in the doses usually given, but little more than a placebo. Ammonia, in the gaseous or liquid form, has been proposed as an antidote to several poisons, especially alcohol, carbonic acid, and prussic acid. For these purposes the stimulant action is desired, but the gas must be used with great caution on account of its irritant effect on the air passages. The injection of ammonia into the veins, as a cure for the bite of venomous serpents, has been practised by Prof. Halford of Australia, and others on his recommendation. Although recoveries have been reported, the question of its efficacy must be regarded as still unsettled.

AMMONIAC, the concrete juice of *dorema ammoniacum*, an umbelliferous plant, a native of Persia. It occurs in masses of a brownish color containing opaque, yellowish, homogeneous tears, or the same tears may be found separated. It is a gum resin with volatile oil. It has been used in medicine as an expectorant and so-called antispasmodic. In the form of a plaster it is used externally. It is allied therapeutically as well as botanically and chemically to asafœtida.

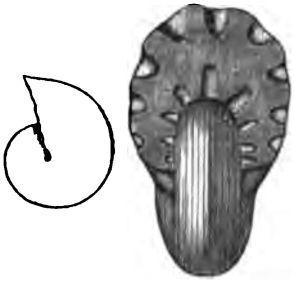
AMMONITES, a genus of fossil shells allied to the *nautilus*. The fossils are in the form of a coil or of a ram's horn, and the name is given to them from their resemblance to the horns upon the statues of Jupiter Ammon. They also resemble a snake in its coil, and are generally supposed by the common people to be petrified snakes. The animal that inhabited the shell was provided with air chambers, by means of which it could rise or sink in the water; and its shelly covering, necessarily very delicate in order to float, was made strong to bear the pressure at great depths by its tubular form and by the ribs or plates of shell that supported it within. From the lower rocks of the transition period up to the tertiary, the ammonite has been represented by many species. They abound especially in the oölite. They appear to have been very widely distributed over the ancient seas, the same fossil species being found in rocks of the same period in different quarters of the globe. They are common in the greensand formation in New Jersey, and far up the Missouri river. In Asia, at an elevation of 16,000 feet, in the Himalaya mountains, some of the same species have been found that are met with in England, and one of the same in the Maritime Alps, 9,000 feet above the sea. They are so abundant in some parts of Burgundy that the roads are paved with them. In the chalk formation they are found of gigantic size, three and even four feet in diameter.

Ammonites Jason.

Ammonites Nodotianus.



Ammonites Cordiformis.



Ammonites Tornatus.

AMMONIUM, the hypothetical radical of ammonia, supposed to be metallic. What is called an amalgam of mercury and ammonium was first obtained by Berzelius and Pontin from the aqueous solution of ammonia. Davy produced it with sal ammoniac; and it has since been obtained by simply dropping an amalgam of sodium and mercury into a strong solution of sal ammoniac. At a temperature of 32° F. it is a firm crystalline mass; at 70° to 80° it is a soft solid. It is about three times the density of water. Gay-Lussac and Thénard consider it a mere combination of mercury and ammonia; but Berzelius regards it as a real amalgam of mercury with a metal composed of one volume of nitrogen and four volumes of hydrogen. Since the discovery of other compound radicals that are capable of neutralizing acids, the question of the metallic character of ammonium has lost its significance, and few chemists are now disposed to insist upon calling it a metal.

AMMONIUM, Oasis of. See SIWAH.

AMMONIUS, a Grecian philosopher, surnamed Saccas or the Sack-carrier, because his official employment was that of public porter of Alexandria, died A. D. 243. By some he is regarded as the founder of the later Platonic school. He numbered among his pupils Longinus, Plotinus, and Origen. According to his system of theological philosophy, God is primarily essence, and secondarily knowledge and power, the last two being developments of the first; the world is committed to the care of inferior divinities; and ascetic life leads to a knowledge of the infinite.

AMMONOOSUCK, Upper and **Lower** or **Great,** two small rivers of New Hampshire, tributary to the Connecticut. The former is entirely in Coös county, and empties in the town of Northumberland. The latter rises in Coös county, flows W. and S. W. through Grafton county, and empties opposite Wells River, Vt.; it has a branch called the Wild Ammonoosuck.

AMMUNITION, military stores or provisions for attack or defence. In modern usage, the signification of the term is confined to the articles which are used in charging firearms and ordnance of all kinds, as gunpowder, balls, shot, shells, percussion caps, primers, and cartridges, prepared and ready for use. Small-arm ammunition comprises cartridges and percussion caps, the latter having replaced flints, and in turn been replaced by an arrangement of the fulminate or exploding materials in the base of the metallic cartridges now coming into general use throughout the world. Field artillery ammunition is composed of shot, loaded shell, case shot, shrapnel, cartridges, priming tubes, matches, portfires, &c., with rockets for rocket batteries. In fortresses and for sieges, the powder is generally kept in barrels, and made up in cartridges when required for use; so are the various compositions required during a siege. The proportion of ammunition accompanying an army in the field varies according to circumstances. Generally an infantry or cavalry soldier carries from 40 to 60 rounds, while a similar or larger quantity per man accompanies the army in wagons, or in exceptional cases, for the use of cavalry, is carried upon pack mules. For field artillery, from 100 to 200 rounds per gun are always kept with the battery, partly in the limber boxes, and partly in separate wagons called caissons. Another 200 rounds are generally with the ammunition reserve of the army, and a third supply follows in wagons, or is kept on hand at depots established at convenient points near the theatre of war. Ammunition for siege and seacoast guns, garrison and naval use, consists mainly of gunpowder, shot, and shell, and is supplied in large quantities proportioned to the probable requirements in each case, the usual practice in time of war being to have from 50 to 150 rounds prepared and ready for use, and the magazines stored with materials for from 600 to 1,000 rounds more. The proportional weights of gunpowder and missiles used in compounding ammunition vary considerably, and are set forth in the manuals and regulations pertaining to that branch of the military service. After a few months of active campaigning, the supplies of ammunition are generally severely drawn upon; and until the introduction of metallic cartridges for small-arms, as much was worn out and rendered useless by the troops while marching as was expended in battle.

AMNESTY (Gr. *ἀμνηστία*, forgetting, oblivion), an act of oblivion; a general pardon of the offences of subjects against the government, or the proclamation of such pardon. Bouvier, in his Law Dictionary, distinguishes between amnesty and pardon. Amnesty, he says, is an act of the sovereign power, the object of which is to efface and cause to be forgotten a crime or misdemeanor; while pardon is an act of the same authority which exempts the individual on whom it is bestowed from the punishment which the law inflicts for the crime he has committed. Amnesty is the absolution and forgetfulness of the offence; but pardon is pity and forgiveness. Pardon is given to one who is certainly guilty; amnesty to those who may have been guilty. The two things differ further, he says, in their effects and application; and as to the latter distinction, he observes, by way of illustration, that pardon is always given to individuals and after judgment, while amnesty may be granted either before or after judgment, and it is in general given to whole classes of criminals or supposed criminals for the purpose of restoring tranquillity in the state. —But it does not appear, after all, that there is any substantial difference between pardon and amnesty. The act of grace is the same, whether it be expressed in the pardon of an individual or in the amnesty of a class, and though the one be granted after conviction and the other before it. The distinctions which this author suggests seem to relate to the different occasions to which the two acts refer, and to the merely incidental results in either case, rather than to anything different in the essential nature of the acts.—During the late civil war, and since it ended, the presidents of the United States have issued several proclamations of amnesty to those who participated in it on the rebel side. President Lincoln issued the first of these proclamations on Dec. 8, 1863. President Johnson issued similar proclamations on May 29, 1865, Sept. 7, 1867, July 4, 1868, and Dec. 28, 1868. Some of these proclamations were limited and conditioned, but the later ones were more liberal, and the last named was very broad and unqualified. With especial reference to this last paper, the question was mooted whether the president, in mere virtue of his office, and without the concurrence of congress, had constitutional authority to order a general amnesty; and in a report of the judiciary committee of the senate made in February, 1869, the authority was emphatically denied. The position taken in this report was rested on two grounds: first, that from the time at least when England had a constitution and settled jurisprudence, the crown did not assume to have a power to grant general pardon or amnesty by its mere proclamation, and without the concurrence of parliament, but that such power was regularly and properly exercised only by statute; second, that for hundreds of years there had been a clear distinction in the English law between pardon and amnesty, and that because the constitution used only the former word it must be understood to withhold from the president the power of granting general amnesty. In reference to the power of pardon our constitution is very clear and precise: "The president shall have power to grant reprieves and pardons for offences against the United States, except in cases of impeachment." The question is, under this constitutional provision, what does its word pardon mean? Does it include such a power of offering general amnesty as these proclamations have assumed to give? It is true that, in very many of the instances, though by no means in all, in which general pardons have been granted in England, they have issued in the form of acts of parliament. But even in these the tenor of the statutes, and the proceedings attending their enactment, concede that the act of grace proceeds from the sovereign alone, and not from parliament. Thus in the acts of 25 Charles II., ch. 5 (1673), after the restoration; of 2 William and Mary, ch. 10 (1690), and of 6 and 7 William III., ch. 20 (1694), after the revolution of 1688; of 3 George I., ch. 19 (1717), relating to the insurrection in Scotland in favor of the pretender; and of 20 George II., ch. 52 (1747), after the second rebellion in Scotland, the title of each runs: "An act for the king's (or sovereign's) most gracious, general, and free pardon." The prerogative of the crown in respect to pardon has also always been recognized in the peculiar character of the bill, even when the pardon goes by act of parliament; for, unlike other bills, it is regularly signed by the sovereign before it is introduced into the houses, and it is read but once in either of them; and when it receives the assent of the houses, this is not signified in the usual form of concurrence, but "the prelates, lords, and commons, in the name of all the sovereign's subjects, most humbly thank his majesty," &c. With regard to the fact that pardons so often issued by statute, it should be remembered that there were usually very substantial reasons for the participation, in a certain sense, by parliament in the sovereign's act of grace, in the fact that a parliamentary act could relieve forfeitures and remove certain other disabilities attending attainders, which a mere pardon could not do; and provisions to this effect were generally introduced into these acts. The fact, therefore, that in any instance a general pardon or amnesty appears to have been granted in the form of an act of parliament, does not of itself imply any denial of the crown's sole prerogative power as to the pardon. More than this, there will be found repeated instances in English history where the sovereign has granted amnesties by general proclamation independently of parliament, and the competency and validity of such acts have never been disputed. In short, so far as the law and practice existed in England before and down to the time of the foundation of our government, it seems to be beyond question that the power of pardon rested finally in the sovereign, and that his grants of general amnesty were conceived to be included in the general power. As to the objection that there was a difference in the English law between amnesty and pardon, it seems to be less sound than the other. Amnesty was never a specific term of the common law, and indeed it rarely occurs even in the statutes or text books. On the other hand, pardon is a technical term of the law, and is almost exclusively employed. It may be safely admitted that, in allusion to great classes of offenders rather than to individuals, and to the political offences involved in seditions and rebellions in distinction from the more usual crimes, amnesty as a word of description is more apposite and familiar than pardon. But this mere use of language does not reach the core of the thing, and it seems to be beyond dispute that the essential nature and operation of amnesty and of pardon in a legal sense are precisely identical. As to the suggestion that the use of the word pardon in the constitution implies a design to exclude amnesty, it would seem to be completely refuted by the history of the debates upon the constitution. (See Elliott's "Debates," vol. iii., p. 497; vol. v., p. 480.) The discussions there reported show that the very questions of the expediency of reposing the power in the president in cases of political offenders, and it may fairly be said of giving him the power of general amnesty, were expressly debated in the conventions. The 74th number of the "Federalist" is even more conclusive upon these points. Hamilton says there that "the expediency of vesting the power of pardoning in the president has, if I mistake not, been only contested in relation to the crime of treason. This, it has been urged, ought to have depended upon the assent of one or both of the branches of the legislative body. . . . But there are strong objections to such a plan. It is not to be doubted that a single man of prudence and good sense is better fitted in delicate conjunctures to balance the motives which may plead for and against the remission of the punishments than any numerous body whatever. It deserves particular attention that treason will often be connected with seditions, which embrace a large proportion of the community, as lately happened in Massachusetts [Shays's rebellion]. . . . But the principal argument for reposing the power of pardoning in this case in the chief magistrate is this: In seasons of insurrection or rebellion there are often critical moments when a well timed offer of pardon to the insurgents or rebels may restore the tranquillity of the commonwealth, which, if suffered to pass unimproved, it may never be possible afterward to recall. The dilatory process of convening the legislature or one of its branches for the purpose of obtaining its sanction to the measure, would frequently be the occasion of letting slip the golden opportunity." Before this question about amnesty to rebels arose, or rather before it was made a subject of debate and dispute, the constitutional power of the president as to pardon was construed as embracing all the significance which the word usually had in the English law; and this was large enough to include amnesty in the sense now under consideration. Chief Justice Marshall defined pardon very early as "an act of grace proceeding from the power intrusted with the execution of the law, which excepts the individual on whom it is bestowed from the punishment which the law inflicts for a crime he has committed." Story, in his "Commentaries on the Constitution" (§ 1,500), gives the broadest scope to the power, and indeed he expressly includes in it the power of granting amnesty to rebels, and adopts, without suggesting any doubt of its pertinency and conclusiveness on this head, and as "the chief argument for reposing the power of amnesty in the president," the language on that point above quoted from Hamilton. The early history of the government furnishes significant illustrations of the opinions then prevailing as to the purport of the constitutional grant. In three instances at least within the first quarter of a century after the formation of the government, the president granted general pardons by proclamation without the participation of congress. The first of them was made by Washington, July 10, 1794, in respect to persons who took part in the "whiskey insurrection" in Pennsylvania. By this he granted a full, free, and entire pardon to all persons, with certain exceptions, of all treasons, misprisions of treason, and other indictable offences against the United States. On May 21, 1800, President John Adams proclaimed a general pardon to all persons who had been engaged in the so-called house-tax insurrection in Pennsylvania in 1798. Again, in February, 1815, President Madison proclaimed a general pardon to certain persons known as the "Barataria pirates." It is the clear opinion of those legal authors who have discussed the question that the constitutional grant was intended to convey the largest power implied in the word pardon, and that it justified such proclamations as have been referred to, and which were issued in virtue of its assumed authority.—Since the civil war the conditions of the question have been in some respects materially changed. When President Lincoln issued his first proclamation, an act of congress existed, that of July 17, 1862, by which congress had authorized the president at any time thereafter, by proclamation, to extend pardon and amnesty to persons who might have participated in the rebellion in any state or part thereof, with such exceptions and at such times and on such conditions as he might deem expedient for the public welfare. But it appears from the tone of the proclamation itself that the president did not conceive that he derived his capacity from this act, either wholly or even in part. For the preamble runs: "Whereas in and by the constitution of the United States it is provided that the president shall have power to grant reprieves and pardons," &c., and "whereas the congressional declaration for limited and conditional pardon accords with the well established judicial exposition of the pardoning power, I do proclaim," &c. In speaking of the act of 1862 as a "declaration for limited and conditional pardon," the president, it may be assumed, was not giving to the act all the dignity and virtue which congress would have claimed for it. It was in fact a direct intimation that the act was of no effect whatever. At all events, in his next message President Lincoln asserted his exclusive authority under the constitution, and his independence of congress in respect to the pardoning power, even more emphatically than in these proclamations. This provision of the act of July 17, 1862, was repealed on Jan. 21, 1867, the bill for its repeal having become a law by the omission of President Johnson to return it within the prescribed time; so that thenceforth, and until the constitution was amended, the power stood solely on the original provision of the second article. The case of *ex parte* Garland, which is the only recent case that touches the subject, was before the supreme court in 1866. Garland, the petitioner, had received in July, 1865, and of course while the section of the act of 1862 was in operation, "a full pardon and amnesty" for all offences. No particular reference was made on the argument to the effect of that act, but the petitioner's counsel quoted the language of the constitution, and relied on the broad construction given to it by Marshall and others. The court in rendering its decision held that the power conferred on the president by the constitution was unlimited, with the single exception stated in it, and that it extended to every offence known to the law, and might be exercised at any time after its commission, either before legal proceedings were taken, or during their pendency, or after conviction and judgment; and it said further that the power was not subject to legislative control, and that congress could neither limit the effect of his pardon nor exclude from its exercise any class of offenders. Though this case is not decisive in respect to the power of granting general amnesty, as the proclamations which have been issued assume to do, the case being one of a special pardon, yet it is at least significant upon the point of the exclusive function of the president in respect to pardons in virtue of the constitutional provision, and against the claim that it is to be shared in any respect with congress.—In 1868 the constitution was changed by the adoption of the fourteenth amendment. This amendment introduced provisions which were thenceforth of a force and validity as high and controlling as the original provision itself, and the two articles are therefore now to be construed together. From the considerations which have been already adduced, it should seem that it was believed that the claim of congress to participate in the pardoning power could be well disposed of only in this way. This provision, it will be seen, expressly brings within the reach and control of congress the cases of the most important offenders in the late war; but it does not, it is conceived, annul the power of the president to grant pardons and amnesties to others than those who are especially described, nor does anything in the amendment throw any light on the right construction of the power under the provisions of article second. As to all else relating to that power and its scope beyond that part of it which is reserved to congress by this amendment, we are remitted to the same general considerations and arguments which have been here suggested. The amendment (July 28, 1868) is in these words: "No person shall be a senator or representative in congress, or elector of president or vice president, or hold any office, civil or military, under the United States, or under any state, who, having previously taken an oath as member of congress, or as an officer of the United States, or as a member of any state legislature, or as an executive or judicial officer of any state, to support the constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But congress may by a vote of two thirds of each house remove such disability."—In January, 1872, in the case of Klein against the United States, the supreme court held doctrines which sustain the positions here taken in respect to the president's power to grant general amnesty under the original provision of the constitution. This case arose before the fourteenth amendment was adopted, and it involves the effect and validity of an act of July 12, 1870 (16 U. S. Statutes, 235), by which congress had attempted to annul the benefits of pardon or amnesty granted by the president, especially with reference to suits by pardoned rebels in the court of claims. The claimant in Klein's case had done certain acts in aid of the rebellion, but he had accepted a pardon under one of the proclamations of amnesty, and had taken and not violated the oath of future fidelity which was prescribed by it. The act of July 12, 1870, provided that the acceptance of any such pardon should be conclusive evidence of the disloyal acts pardoned, and that on proof of such pardon and acceptance, and on account of the very disloyal acts so proved, the court of claims and the supreme court on appeal should decline jurisdiction of any suit on the part of such pardoned rebel. But the court held that congress had no power to make any such law, and refused to enforce its provisions. With reference to the repeal in 1867 of the act of 1862 already referred to, Chief Justice Chase says that the repeal was made after, and he fairly implies in consequence of, the decision in the Garland case, where it had been held that the president's power of pardon was not subject to legislation, and that congress could neither limit the effect of his pardon nor exclude from its exercise any class of offenders. The court also sustained the position assumed by President Lincoln in regard to his exclusive authority under the constitution. The court further held that "it is the intention of the constitution that each of the great coördinate departments of the government, the legislative, the executive, and the judicial, shall be in its sphere independent of the others. To the executive alone is intrusted the power of pardon, and it is granted without limit. Pardon includes amnesty. It blots out the offence pardoned, and removes all its final consequences. It may be granted on condition. In these particular pardons" (that is to say, under proclamations of amnesty, for the case before the court was one of that sort), "that no doubt might exist as to their character, restoration of property was expressly pledged, and the pardon was granted on the condition that the person who availed himself of it should take and keep a prescribed oath. It is clear that the legislature cannot change the effect of such a pardon, any more than the executive can change a law. The court is required to disregard pardons granted by proclamations on condition, though the condition has been fulfilled, and to deny them their legal effect." This the court declined to do, and affirmed the judgment of the court of claims, which had awarded restitution to the claimant.

AMŒBA. See ANIMALCULES.

AMONTONS, Guillaume, a French physicist, born in Paris, Aug. 31, 1663, died Oct. 11, 1705. He was deprived of hearing in early life by disease. It is said that he refused to make any effort to relieve his malady, and devoted himself diligently to the study of geometry and mechanics. He wrote several important treatises upon scientific subjects, and constructed some new instruments in physical science. He conceived the idea of communicating between distant points by signals to be observed through magnifying glasses, and made successful experiments before the royal family, though the use of the signal telegraph was not introduced till nearly a century afterward.

AMOOR, Amur, or **Saghalien,** a river in N. E. Asia, formed by the confluence of the river Shilka, flowing N. E. from the Trans-Baikal region in central Siberia, and the river Argoon, coming from Mongolia nearly in the same direction. The two rivers unite at the spot called Streletchnaya Stanitza (Shooter's Post), in about lat. 53° 20′ N., and lon. 121° 30′ E. The Amoor runs between the Russian Amoor Country and northern Mantchuria, making an arc, and penetrating S. as far as lat. 47° 30′; then flowing N. E. it empties in nearly the same latitude with its rise, in lon. 141° E., into the gulf of Amoor, W. of the island of Saghalien, a gulf connected by straits N. and S. with both the sea of Okhotsk and the sea of Japan. The whole length of the river is about 2,400 m. Its principal northern affluents are the Oldo, Jenkiri, Bureya, and Amgoon; its southern, the Songari and Usuri. The Amoor is navigable for its whole length; its estuary, however, is filled with sand and soft mud, rendering the passage difficult for 30 to 40 m. from the mouth. It freezes throughout its course at the beginning of November, and remains frozen till March, forming a highway for sledges. During winter the shores are visited by heavy snow storms, called in Siberia *purga*. Both shores are covered with thick forests of pine, oak, lime, maple, and cork trees. The river abounds with fish, and contains some previously unknown species of sturgeon. A steamer called the America, built in New York for the navigation of this river, first ascended it in 1857.

AMOOR COUNTRY, that part of Mantchuria recently annexed to Russia. It embraces all the territory on the left bank of the Amoor, together with the coast districts east of it and of its affluent the Usuri, as far south as the river Tumen on the frontier of Corea. In its widest sense, it is situated between lat. 42° and 57° N., and lon. 120° and 145° E. By a ukase of Dec. 20, 1858, the country was divided into the "province of the Amoor," and the "sea district of the Amoor Country." The latter forms a part of the "littoral province of East Siberia." The province of the Amoor embraces the country on the left bank of the Amoor; capital, Blagovieshtchensk; area estimated at 109,053 sq. m.; pop. in 1867, 22,297. The principal towns in the sea district of the Amoor Country are Nikolayevsk and Sofyevsk. The island of Saghalien is generally included in the territory of the Amoor Country, the whole of which has an area of about 276,300 sq. m. The principal mountains are the Stanovoi along the northern frontier, and offshoots of the Chingan mountains in the west. The winters are very severe, and navigation is generally closed from the end of October to the beginning of May. The soil is fertile. Many plants of southern Asia are met with; the rivers swarm with fish; and extensive gold fields have recently been discovered. Although the Russian government has endeavored to develop the resources of the country, its commerce made no progress during the period from 1860 to 1870. The native population consists of about 10,000 Tungusians, divided into eight tribes. In September, 1860, the Russian government organized a force of Cossacks of the Amoor to defend the southern frontier and to settle the territory.—The first knowledge of the country of the Amoor was obtained by the Russian authorities in East Siberia, in 1639. Several expeditions, undertaken by Russian adventurers, led to protracted hostilities with the Chinese, until in 1689 the peace of Nertchinsk secured the whole territory to the Chinese. In 1849 the Russian plans of conquest were resumed. After exploring the coast for several years and establishing the forts of Nikolayevsk and Mariinsk, a large military force was sent in 1854 into the country of the Amoor, and established the Russian rule upon a lasting basis. A ukase of Oct. 31, 1856, proclaimed the union of the lower part of the Amoor Country with Kamtchatka, and made Nicolayevsk the seat of government. By the treaty of Aigoon, May 28, 1858, ratified by the commercial treaty of Tientsin, June 13, the whole country of the Amoor was ceded by China to Russia. The eastern and western line between Russia and China was regulated by a treaty concluded at Peking on Nov. 14, 1860. —For an account of the attempt to construct a telegraph from Nikolayevsk to San Francisco in 1863–'7, see TELEGRAPH. Concerning the country and river, see Collins, "Exploration of the Amoor River" (Washington, 1858), and "A Voyage down the Amoor, with a Land Journey through Siberia," &c. (New York, 1860).

AMOR. See EROS.

AMORETTI. I. Carlo, an Italian scholar, born at Oneglia, March 13, 1741, died in Milan, March 24, 1816. In 1757 he joined the order of St. Augustine, and some years later became professor of canon law in the university of Parma; but in 1772 he obtained a dispensation from his monastic vows, and entered the ranks of the secular clergy. He was appointed curator of the Ambrosian library at Milan in 1797, and was the first to make known its treasures to the world. He published from the manuscripts in this collection voyages of Pigafetta and Ferrer Maldonado; wrote an excellent life of Leonardo da Vinci, from original materials; and prepared several treatises on natural science. His *Nuova scelta d'opuscoli interessanti sulle scienze e sulle arti* (27 vols. 4to, 1775–'88) familiarized the Italians with the scientific progress of other nations. **II. Maria Pellegrina,** niece of the preceding, who bestowed great pains upon her education, born at Oneglia in 1756, died in 1787. At the age of 16 she sustained, in public, arguments on various topics in philosophy. She studied law, and at the age of 21 graduated at Pavia, and received from the university her doctor's diploma. She wrote a treatise on Roman law, which was published after her death.

AMORITES (according to Simonis and Ewald, highlanders), the most powerful tribe of the Canaanites, to all of whom the name is occasionally applied in the Hebrew Scriptures. They dwelt W. of the Jordan, in the territory subsequently allotted to Judah, chiefly in its mountainous portion; and E. of that river they held the two kingdoms of Heshbon and Bashan, of the latter of which the gigantic Og was king when Moses invaded their country. They were a people of large stature and great prowess, and the Israelites had long and severe contests with them, under Moses, Joshua, and other leaders.

AMORTIZATION, or **Amortizement** (law Lat. *amortisare*), in old English law, the alienation or conveyance of real estate to corporations. It was prohibited by a series of statutes, the earliest of which, the Magna Charta of Henry III., applied only to ecclesiastical, but which were subsequently extended to all corporations. Their influence is not yet extinct, either in England or America, though the powers of corporations have been much enlarged in both countries, and in some states put upon the same footing in this regard with those of private parties. These statutes were called the statutes of *mortmain*, as forbidding conveyances into dead hands; hence amortization.

AMORY, Thomas, an English author, born about 1691, died Nov. 25, 1788. He was educated as a physician, but lived chiefly in retirement on a small income. In 1755 he published "Memoirs of several Ladies of Great Britain," all of whom were, like himself, zealous Unitarians; and in 1756 appeared the first volume of his better known and very curious "Life of John Buncle, Esq.," in which he is supposed to have sketched his own picture. The second volume was published in 1766. He was a man of learning, ability, and deep religious convictions, but very eccentric.

AMOS, one of the minor prophets, who prophesied in the days of Uzziah, king of Judah, and Jeroboam II. of Israel, toward the close of the 9th century B. C. He was a native of Tekoah in Judah. He does not appear to have been educated as a prophet, but according to his own account was taken from his flocks to prophesy. His prophecies were especially addressed to the kingdom of the ten tribes, and were delivered in the time of their greatest prosperity as a separate people. They denounce the idolatry practised at Bethel, Gilgal, Dan, and at Beersheba in Judah, and also the sins of the nations bordering on both Hebrew kingdoms, and predict punishment, as well as a brighter future for the Israelitish people.

AMOSKEAG. See MANCHESTER, N. H.

AMOY (Chin. *Hia-men* or *Sya-min;* Fr. *Émouy*), a seaport town of the province of Fokien, China, situated at the S. end of an island of the same name, in lat. 24° 40′ N., lon. 118° 18′ E., opposite the centre of the island of Formosa; pop. about 250,000. It is built upon rising ground, facing a very spacious and excellent harbor, contains many large buildings, had at the time of the British invasion several considerable forts, one of them 1,100 yards long, and is reckoned to be nearly 9 m. in circumference. It is the port of the large inland city of Chang-choo-foo, with which it has river communication. Its inhabitants are chiefly employed in trade, and its merchants are reckoned among the most enterprising in China. The port was open to the world till 1734, when it was closed. It was captured by the British in 1841, and by the treaty of Nanking was thrown open, first to Britain, then to all nations alike. The native merchants carry on an extensive trade coastwise, and with Formosa, Manila, Siam, and the Malay islands. The foreign imports in 1870 were valued at $4,500,000, and the exports at $2,300,000. Amoy is a principal seat of Protestant missionary activity, and the missions of the Reformed church of America and other denominations in 1869 numbered 1,271 communicants.

AMPÈRE. I. André Marie, a French physicist and mathematician, born in Lyons, Jan. 20, 1775, died in Marseilles, June 10, 1836. As a boy he showed a singular passion for mathematics, in which at 10 years of age he had made remarkable progress, but could not be persuaded to apply himself with zeal to other studies. He finally consented to study Virgil, that he might be able to master the works of Euler and Bernoulli, which were then accessible only in Latin. At the age of 18 he had gone through the whole range of scientific studies, and had read the great encyclopædia of Diderot and D'Alembert so thoroughly, that 40 years afterward he could still repeat whole pages of it. The death of his father by the guillotine during the revolution affected him so that for upward of a year his friends feared that his intellect had been permanently impaired. In 1802 he was appointed professor of mathematics at Lyons, a post which he owed to his first publication, "Considerations upon the Mathematical Theory of Games of Chance." In 1805 he became a teacher in the polytechnic school at Paris, in 1808 inspector general of the university, in 1809 professor of mathematical analysis in the polytechnic school, and in 1814 a member of the institute. In 1820 he began to devote much attention to the phenomena of electro-magnetism, and in 1824–'6 published *Recueil des observations électro-dynamiques* (2 vols.), a work characterized by profound thought and extraordinary philosophical sagacity. His publications are numerous, many of them being contributions to the *Journal de l'école polytechnique* and the

Mémoires de l'institut. Ampère was a man of genial humor and great simplicity of character, and singularly ignorant of the world, from which he lived retired. He was engaged on his last great work, "The Classification of the Sciences," at the time of his death. **II. Jean Jacques Antoine**, son of the preceding, born in Lyons, Aug. 12, 1800, died March 27, 1864. His education was completed under the supervision of his father at Paris, where he enjoyed the friendship of Mme. Récamier and Chateaubriand. He pursued a course of philosophy with Cousin, and early conceived a passion for English and German literature, romance, and belles-lettres. After some years devoted to travel and literary pursuits, he was in 1833 appointed professor of the history of French literature in the college of France. His work on the early and mediæval literature of France (4 vols.) was a résumé of his lessons. In 1842 he was elected a member of the academy of inscriptions and belles-lettres, and five years afterward of the French academy. He visited many parts of Europe and the East, studied successfully the hieroglyphics of Egypt, and contributed to the *Revue des Deux-Mondes* a well written series of articles on a journey in Egypt and Nubia in 1844. He also made an extended tour in the United States, paying much attention to aboriginal remains and antiquities, and observing carefully the habits of the people. The result of his travels was published in the *Revue des Deux-Mondes.* His works entitled *De la Chine et des travaux de Rémusat*, and *La Grèce, Rome et Dante*, evince his knowledge of languages and general literature; and he published in 1841 a valuable essay on the formation of the French language. Among his other works is *L'Histoire romaine à Rome* (4 vols. 8vo, 1856-'64), a novel application of archæology to literature and politics. His *Correspondance*, constituting an autobiography, was published in Paris in 1872.

AMPFING, a village of southern Bavaria, on the Isen, 5 m. W. of Mühldorf, noted as the scene of a terrible conflict in 1322 between the emperor Louis the Bavarian and Frederick of Austria, generally known as the battle of Mühldorf, in which Frederick was entirely defeated and captured. In 1800 the famous retreat of Moreau was begun here.

AMPHIARAUS, a mythical hero and seer of Greece, the son of Oïcles and Hypermnestra. He was married to Eriphyle, sister of Adrastus, king of Argos, by whom he had numerous sons. Having sworn that he would abide by the decision of his wife on any difference which might arise between himself and Adrastus, Eriphyle took advantage of this oath to force Amphiaraus to join in the enterprise of the seven against Thebes. Before setting out he made his sons promise to punish her treachery. (See ALCMÆON.) At the siege of Thebes he greatly distinguished himself, but being pursued by Periclymenus, he fled toward the river Ismenius, where the earth opened and swallowed him. Jupiter made him immortal. An oracle of Amphiaraus, near Thebes, enjoyed great reputation among all the Greeks.

AMPHIBIA, animals which frequent both land and water. There is probably no truly amphibious animal, as that would imply the possibility of living and breathing equally well in air and in water. The old naturalists gave the name to beavers, otters, frogs, and other animals from all the orders of vertebrata; Linnæus restricted the term to reptiles with cold blood and simple circulation; Cuvier called amphibia such mammals as can dwell on land or in the water, like the seal, the walrus, and the dugong, occupying a position intermediate between the feline and the marsupial animals. There are animals which have both gills and rudimentary lungs, as the proteus, the siren, and the menobranchus, but they are decidedly aquatic, and perish sooner or later in the air. The *amphibia* constitute an order of reptiles (the *batrachia* of later herpetologists), and may be characterized as vertebrated animals, with cold blood and naked skin, reproducing by means of eggs, and most of them undergoing a metamorphosis or change of condition, having relation to a transition from an aquatic respiration by gills to an atmospheric respiration by lungs, and a consequent alteration in general structure and mode of life. These characters have led some writers to consider the amphibia as a distinct class, instead of a mere order of reptilia. No arrangement proposed by naturalists presents a perfect division of the different forms; the following by Mr. Thomas Bell of London, founded on the absence or presence and duration of the gills, seems the most natural: Class AMPHIBIA. Order 1. AMPHIPNEURA. Body elongated, formed for swimming; feet either four, or two anterior only; tail compressed, persistent; respiration aquatic throughout life, by external persistent gills, coexisting with rudimentary lungs; the eyes with lids. Genera, *proteus*, *siren*, *siredon*, *menobranchus*, *pseudobranchus.*—Order 2. ANOURA. Body short and broad; feet during the tadpole state wanting, afterward four, the hinder ones long and formed for leaping; tail before the metamorphosis long and compressed, afterward wanting; ribs wanting; vertebræ few and anchylosed together; respiration at first aquatic by gills, afterward atmospheric by lungs; gills at first external, but withdrawn into the chest before the metamorphosis; impregnation effected externally during the passage of the eggs. Genera, *rana*, *hyla*, *ceratophrys*, *bufo*, *rhinella*, *otilopha*, *dactylethra*, *bombinator*, *breviceps.*—Order 3. URODELA. Body long and slender; feet always four; tail long and persistent; ribs very short; respiration at first aquatic by external gills, afterward atmospheric by cellular lungs; vertebræ numerous and movable; impregnation internal. Genera, *salamandrina*, *salamandra*, *molge.*—Order 4. ABRANCHIA. Body long and formed for swimming; feet four; cranium solid; tail compressed; respiration by lungs only; gills absent; no metamorphosis known. Genera, *menopoma*, *amphiuma*.—Order 5. APODA. Body elongated, slender, and snake-like; feet none; tail very short, almost wanting; lungs, one larger than the other; ribs very short; breast bone wanting; impregnation unknown, probably internal. The existence of gills at any period of life is unknown. Genus, *cæcilia*. —In the adult amphibia the skeleton varies considerably. In the frog, which moves extensively on land, we find the hind legs greatly developed to enable it to take the enormous leaps by which it pursues its prey and escapes from danger; hence it has no useless tail, the body is contracted longitudinally into a short space, and the vertebræ are few, united into a single immovable piece unprovided with ribs. On the contrary, the water salamanders or newts have a long tail, a slender flexible body, and all their organs fitted for aquatic life. The structure of the bones is more compact and calcareous, and less transparent and flexible, than in fishes. The bones of the skull do not overlap each other, but have their margins in contact and occasionally united; the bones of the face are more closely united to those of the skull than in the fishes; the intermaxillary and jaw bones are much developed transversely, expanding the general form of the skull without involving any enlargement of the brain cavity, which is very small. The hyoid bone experiences most remarkable changes in those genera which undergo metamorphosis. In the highest amphibia, the bones of the spine are very few; in the frog there are 9, in the pipa only 8, unprovided with ribs, but having long transverse processes; the anterior articular surfaces of the bodies are concave, and the posterior convex. In the tadpole, and in the genera which retain their gills through life (*siren*, *menobranchus*, &c., hence called perennibranchiate), the substance between the vertebræ is soft, and contained in cup-like hollows formed by the concave articular surfaces of contiguous bones, precisely as in fishes; another proof of the intermediate condition of these lower forms of the class. In the salamanders the vertebræ are more numerous, especially those of the tail; in the siren the trunk has 48, and the tail as many more. The limbs are arranged on very different plans in the different groups; in the frogs and toads they are well developed, and suited for active leaping and swimming; in the elongated aquatic species the limbs are small and feeble; in cæcilia, there are not even the rudiments of limbs; in these the imperfect development of the extremities is compensated by the extent of the spine of the body and tail, by the curves and flexures of which they swim with considerable rapidity. In the fish-like tadpole, the limbs are at first scarcely perceptible, and in their gradual development acquire a considerable size and well-defined form while yet imprisoned beneath the skin; the hind legs are first seen; the tail is much developed, gradually disappearing by absorption as the limbs acquire their full size. All the amphibia have teeth on the palate; the salamanders have them also in both the upper and lower jaws, the frogs in the upper only, and the toads in neither; the jaw teeth are always slender, sharp-pointed, and closely set; the frog has about 40 on each side of the upper jaw; the salamander has about 60 above and below; the palatine teeth are generally arranged transversely, parallel to the jaw teeth. In the adult amphibia the gullet is wide and short; the stomach is a simple sac, elongated in the aquatic species; the intestine is but slightly convoluted, and terminates in a cloaca, or pouch, which also receives the openings of the genital and urinary organs. The vent in the frogs and toads opens on the hinder part of the back; in the other forms it is beneath the commencement of the tail, as in ordinary reptiles. The liver, pancreas, and spleen are found in all the class. The lymphatic and lacteal systems are extremely developed; in the course of the lymphatics are found pulsating cavities or ventricles which propel their contents toward the veins, but their pulsations do not coincide with those of the heart, nor those of one side with those of the other. In the circulating system we find the most convincing proof of the intermediate position of the amphibia; they begin life with the single heart and gills of fishes, but as their metamorphosis goes on, the heart assumes the compound character necessary for the pulmonary respiration of the reptiles. The heart in the early stage of these animals consists of a single auricle which receives all the blood after its circulation, and a single ventricle which sends it through a third cavity, the *bulbus arteriosus*, to the gills or branchiæ; in the gills the blood is purified by the oxygen of the water, and returned by their veins to the aorta; from the last branchial artery a branch is given off on each side, which goes to the rudimentary lungs and afterward becomes the pulmonary artery; between the branchial arteries and veins are small communicating branches, which, as the gills are absorbed, gradually enlarge until they form continuous trunks, and the original branchial artery becomes the root of the two descending aortæ, at the base giving off the pulmonary artery; the two veins which return the blood from the rudimentary lungs enlarge as these organs are developed, and become the pulmonary veins, which last, being distended at their point of union with the heart, ultimately form the second auricle. The circulation, then, of the adult amphibia assumes the character which we find in the reptiles generally, being performed by a single ventricle and two auricles; the pure blood in the pulmonic auricle and the impure blood in the systemic auricle are sent together and mixed in the single ventricle, so that a half-purified blood is distributed to the organs. The gills, whether external or internal, are expanded in a leaf-like form, considerably divided, though much less so than in fishes; in the earliest stages they are always external, and remain so permanently in the order *amphipneura*, but in the higher orders they become very soon internal; they are supported by cartilaginous or bony arches connected with the hyoid bone, which changes its form in accordance with the development of the respiratory organ. On the leaflets of the gills the minute blood vessels run, bringing the venous blood into contact with oxygen, and sending it back purified to the heart. While some amphibia retain their gills through life, with coexistent rudimentary lungs, others lose them entirely as the lungs are developed, so that there probably is a brief period in the life of some of these animals in which they may truly be called amphibious. In the caducibranchiate genera (or those which lose their gills), the early condition of the lungs is that of a mere sac without any appearance of the cells or pulmonary structure afterward developed; it becomes, therefore, an interesting question whether the similar rudimentary lungs of the perennibranchiate genera can serve any of the purposes of respiration. From the mechanism of respiration in the higher genera, and the anatomical deficiencies in the accompanying apparatus in the lower, it would be at once seen that these simple sacs could hardly aid the gills, and much less could perform their office in aërating the blood. Rusconi concludes that in the proteus, at least, these sacs do not assist in respiration; and experiments alluded to in the "Proceedings of the Boston Society of Natural History," vol. vi., p. 158, show that the menobranchus perishes in about four hours when removed from the water. In the higher orders, the reception of air into the lungs is effected by a simple act of swallowing; the air enters the mouth through the nostrils, and, the gullet being closed, is forced into the lungs by the action of the muscles of the hyoid bone. The fish-like structure of the nostrils in the lower genera, and the imperfect condition of their glottis and windpipe, with the perfect development of the gills, show that, like the air bag of fishes, these simple sacs, though they represent rudimentary lungs, are not for the purposes of respiration proper. The brain offers the same gradations, from the fish-like simplicity of that of the tadpole and lower genera to that of the reptile, in which the hemispheres become enlarged laterally, and the spinal cord shorter and thicker at the origins of the nerves of the limbs. In the frogs the eyes are large and prominent, in the salamanders comparatively small, and in the cæcilia scarcely visible; in all they resemble those of fishes in the flattened anterior surface, the small quantity of the aqueous humor, and the depth of the crystalline lens; the eyes of the frog are fully developed, and provided with lids. In the lower genera and in the tadpole state, the organ of hearing is very imperfect, consisting of a hollow in the temporal bone, at the bottom of which is the sac containing the cretaceous body on which the nerve is spread; there is no drum nor tympanic cavity; the organ is covered by the skin, without any external communication. In the frog the ear is more complicated, having the drum with its cavity and bones, and communicating with the mouth by a Eustachian tube. The sense of smell must be imperfect in the amphibia; in the lower forms the nostrils are mere cavities in the front of the head, with no communication with the mouth, as in fishes; in the higher orders the nose communicates with the mouth, but in them the apparatus for smelling is probably less sensitive than in the lower forms, the nose being more connected with the act of breathing. The sense of taste is probably also very obtuse; in the frogs and toads the tongue is developed to an extraordinary degree, being long, with the anterior half free, doubled back on itself, and capable of being thrown forward and retracted with great quickness, serving for the seizure of the insects on which they feed, and for conveying them instantly to the back part of the mouth. The amphibia are distinguished from reptiles by the absence of all scaly covering; a naked skin characterizes all, from the snake-like cæcilia to the fish-like axolotl. The skin of the aquatic genera is soft, smooth, and kept constantly moist by the cutaneous secretions; in the land genera, as frogs and toads, the glands of the skin secrete a thick whitish fluid, which may become acrid and irritating, giving rise to the opinion that these secretions are poisonous; in the salamander the fluid thus poured out is so abundant, and so suddenly secreted when the animal is irritated, that it is quite probable that even the effects of fire may be for a short time arrested by it—doubtless the origin of the well known fable in regard to this animal. The cuticle is frequently shed; that of the aquatic genera being washed away in shreds, while that of the toads is divided along the median line, removed by the contortions of the animal, and finally swallowed at a single gulp. The amphibia breathe by the skin as well as by the lungs and gills; a frog will live from five to six weeks in a state of complete strangulation, and even after total excision of the lungs; indeed, the pulmonary respiration is insufficient to support life in these animals without the assistance of the skin. The medium through which the blood is oxygenated, whether lungs, gills, or skin, whether in air or in water, is always a modification of the cutaneous surface; and, as in frogs the same surface is capable of performing both aquatic and atmospheric respiration, it is natural to infer that lungs and gills are identical in structure. The amphibia, like many of the invertebrate animals, have the power of reproducing parts lost by accident or design; the common water salamander will invariably restore the limbs which have been cut off for experiment, and even repeatedly; the common land salamander also reproduces its tail, which it so easily separates in case of need. Impregnation is effected without sexual congress, except in the land salamander; in the order *anoura*, the male embraces the female with great tenacity, and impregnates the eggs, several hundred in number, as they are ejected under his pressure; in the tailed aquatic species, impregnation takes place during the instantaneous apposition of the cloacal openings of the two sexes. The testes and ovaries are double, and symmetrically arranged; they are much enlarged at the breeding season. When the young are ready for aquatic life, they burst the thin membrane of the egg, and come out in the fish-like form. In the terrestrial salamander, whose habits do not permit this mode of development, the young undergo their metamorphosis in the oviduct, in which they pass their tadpole state, and appear without gills when they are ready for terrestrial existence. Like the viper, the salamander is ovoviviparous. In the pipa, or Surinam toad, the eggs, instead of being dropped into the water, are placed by the male on the back of the female; here they are attached by a thick mucus, and the skin gradually thickens in the intervals so as to form a cell around each egg; in these cells the young undergo their metamorphosis, and come from them perfect animals. After the young are hatched out, the cells of the female disappear. Like many of the saurian and chelonian reptiles, some of the amphibia are used as food. The delicacy of the frog's thigh is well known to the epicure. The Mexicans consider the siredon or axolotl very good eating; and it is quite probable that, like the reptile iguana, many of the hideous amphibia are wholesome articles of food.

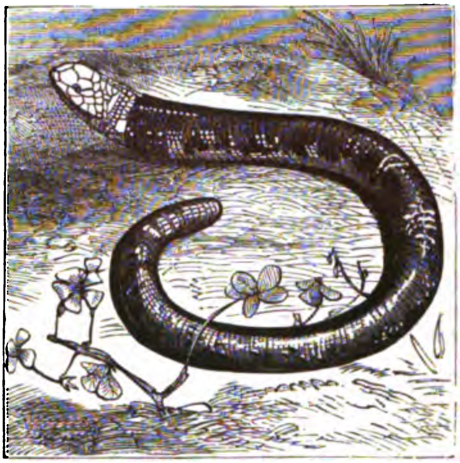
AMPHICTYONS, members of an amphictyony, a term used by the ancient Greeks to designate an association of neighboring tribes or cities for the observance of the law of nations toward each other, and the protection and worship of some deity, whose temple was supposed to be the common property of all. The word is sometimes derived from the mythical hero Amphictyon, son of Deucalion and Pyrrha, but is properly a compound from ἀμφί and κτίζω or κτίω, signifying "dwellers around" or "neighbors." The origin of these associations is enveloped in much obscurity, and beyond the fact that several of them existed in Greece at a very remote period, forming as it were the germ of one of the strongest bonds of union by which the Greek tribes were held together, we know nothing of the circumstances of their formation. The most celebrated of these confederations was that known as the amphictyonic council, which from small beginnings rose to great importance, on account of the wealth and magnificence of the temple of Apollo at Delphi, of which it was the special guardian. It was composed of 12 tribes, variously described by the authorities, but generally supposed to comprise the Ionians, Dolopians, Thessalians, Œtæans, Magnetes, Malians, Phthian Achæans, Dorians, Phocians (including the Delphians), Locrians, Bœotians, and Perrhæbians, all of whom originally dwelt in and around Thessaly and were of equal importance, although subsequently we find them distributed over all parts of Greece. Some became utterly insignificant or extinct, and the fact of the Dorians standing on an equality with the Dolopians or Malians shows that the council must have existed before the Dorian conquest of the Peloponnesus. The council met twice a year, in the spring at the temple of Apollo at Delphi, and in the autumn at that of Ceres at Anthela, near Thermopylæ, and was represented by two classes of deputies from each tribe, the hieromnemons and the pylagoræ, whence it has been supposed that two amphictyonies, organized for the worship of two distinct deities, were subsequently merged in one. The 12 tribes had equal rights at the meetings of the council, and each was entitled to two votes, to be given by its deputies. The objects of the confederation are best described in the following oath which each of its members was obliged to take: "We will not destroy any amphictyonic town, nor cut it off from running water in war or peace; if any shall do so, we will march against him and destroy his city. If any one shall plunder the property of the god, or shall be cognizant thereof, or shall take treacherous counsel against the things in his temple at Delphi, we will punish him with foot and hand and voice, and by every means in our power." Notwithstanding the humane and wise objects of the council, it engaged in two sanguinary wars against some of its own members, called the first and second sacred wars, and finally lent itself to the ambitious purposes of Philip of Macedon, who in the name of the league excited a third war in 338 B. C., in which the liberties of Greece were extinguished at the battle of Chæronea. The first of these wars, which began in 595 B. C. and lasted till 585, was declared against the Phocian city of Crissa, on account of injuries inflicted upon persons visiting the oracle of Apollo at Delphi, and resulted in the total destruction of the city. The second sacred war, from 355 to 346 B. C., originating in a charge against the Phocians of taking into cultivation a tract of land belonging to the Delphic temple, was carried on with such vindictiveness that nearly every Phocian town was destroyed. Philip of Macedon, having entered the struggle at the solicitations of the Thessalians, decided the war in their favor, and thus gained his fatal ascendancy in the affairs of Greece. The Phocians were ejected from the league at the close of the war, but were subsequently readmitted. The duration of the amphictyonic council is not precisely known, but it survived the independence of Greece.

AMPHILOCHUS, a legendary hero of Greece, the son of Amphiaraus and Eriphyle, and brother of Alcmæon. He took part in the war of the epigoni against Thebes, aided his brother in the murder of their mother (see Alcmæon), and subsequently joined the expedition against Troy. He was celebrated for his prophetic gifts, and had an oracle at Mallus in Cilicia (a city said to have been founded by Amphilochus and Mopsus), which was esteemed the most truthful of all oracles; and at Athens, Oropus, and Sparta he shared in the divine honors paid to Amphiaraus.

AMPHION, in Greek mythology, a son of Zeus and Antiope, the wife of Lycus, king of Thebes. He and his brother Zethus were exposed on Mount Cithæron, but were found and brought up by shepherds. Mercury, or according to others Apollo or the muses, gave a lyre to Amphion, who from that moment devoted himself altogether to song and music. To avenge the wrongs of their mother, the brothers undertook an expedition against Thebes, which they captured and fortified, slaying both Lycus and his new wife Dirce. They then built a wall around the town, Amphion playing on his lyre, and the stones moving in obedience to its notes whither they were wanted till it was finished. Amphion married Niobe, by whom he had many sons and daughters, all of whom were killed by Apollo.

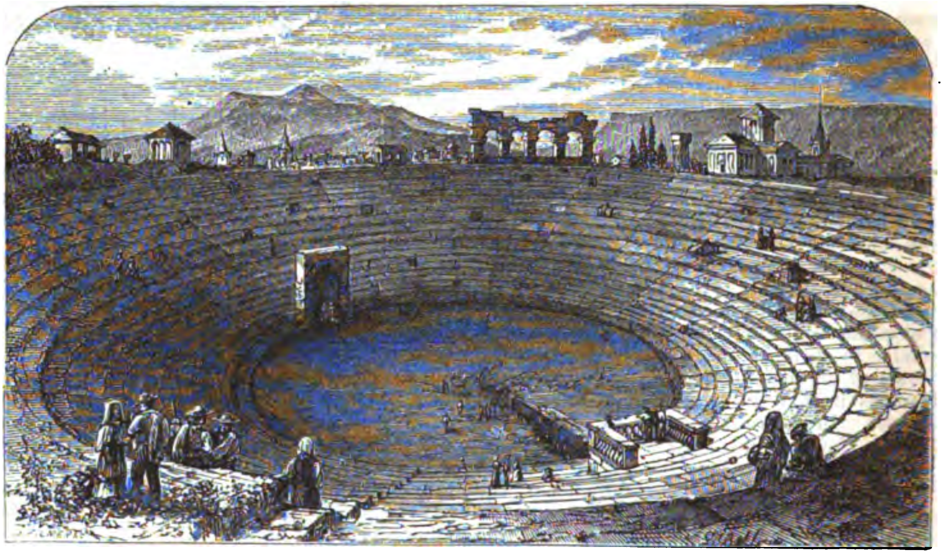
AMPHIPOLIS (now *Jenikeui*), a city of ancient Macedonia, on the Strymon (now Struma, or Kara Su), near its mouth. It was originally called Ennea Hodoi (Nine Ways), and held by the Thracian Edonians, and received its historical name from an Athenian colony which occupied it in 437 B. C. It was besieged by the Lacedæmonians under Brasidas during the Peloponnesian war, and compelled to surrender to them (424). Later it fell into the hands of Philip of Macedon, and under the Romans it was the capital of a Macedonian district. In the middle ages it was called Popolia. There are few remains of the town.

AMPHISBÆNA (Gr. ἀμφίσβαινα, an animal that can move or walk in both directions), the name of a genus of saurians. The head is so small and the tail so thick and short that it is difficult to distinguish one from the other at first sight; and this peculiarity of form, in addition to the animal's habit of proceeding with equal facility either backward or forward, has given rise to the popular belief in Brazil and other parts of South America, where the amphisbæna most abounds, that it possesses two heads, one at each extremity. These saurians are distinguished from others by their nearly uniform thickness of body from the head to the extremity of the tail, by their small mouths and extremely diminutive eyes, remarkably short tails, and numerous rings of small square scales, completely surrounding the body and the tail. The jaws are furnished with a single row of small conical teeth, few in number and distant from each other, and the palate is toothless. These reptiles are also destitute of fangs, and are therefore harmless. They live mostly on ants and other small insects, and inhabit ant hills and burrows which they make for themselves under ground. The genus *amphisbæna* contains only a few species, confined to Brazil, Guiana, and other tropical parts of the American continent. The *A. fuliginosa* is the best known species. It is found in the hotter regions of South America, and does not inhabit Ceylon or any part of the East Indies, as Linnæus and Lacépède were led to believe, on the authority of Seba. The general color of this animal is a deep brown, varied with shades of white, more or less clear, according to the season of casting the old and acquiring the new external coat or "skin." It grows to the length of 18 inches or 2 feet, the tail measuring only one inch or thereabouts. The body, about as thick as the wrist of a child of 10 years, is surrounded by upward of 200 rings, and the tail by 25 or 30. The eyes, exceedingly diminutive, are covered by a membrane which almost conceals them; and this has given rise to the popular opinion that the amphisbæna has no eyes.



Amphisbæna fuliginosa (Sooty Amphisbæna).

AMPHITHEATRE, with the Romans, an open elliptical building, with an elliptical space in the centre called the arena, from the low wall surrounding which rose tiers of seats, supported on arches, receding to near the summit of the outer wall. These buildings were used for public games or combats between men or beasts, and in later times also for exhibitions of mimic sea fights, and of crocodiles and other amphibious animals, by filling the arena with water. The arena was so called because sand (Lat. *arena*) was usually employed to give a firm footing and to dry up the blood. The wall around the arena varied in height from 8 to 18 feet. On a level with its top spread the first platform, where the chairs of the more honored spectators were placed. From the top of the wall that formed the back of this space rose the first tier of seats, reaching to another platform with another wall at its back, and so on to the top. The box (*suggestus* or *cubiculum*) of the chief magistrate or emperor was on a conspicuous part of the first platform (*podium*), as was that of the vestal virgins. A raised seat on the same was also assigned to the giver (*editor*) of the games. At each end of the arena was a large door for the entrance and exit of men and beasts. The latter were kept in dens under the platforms and seats, and were sometimes forced upon the arena through small doors in the side of the wall surrounding it. Sometimes also, if not always, there were vast substructions beneath the floor of the arena containing dens from which the animals might be suddenly sent up through trap doors. Excavations in the amphitheatre at Pozzuoli have shown most clearly these arrangements. On the top of the wall of the arena was a railing of bronze or iron to protect those who sat on the first platform from any sudden spring of the wild beasts. As a further defence, ditches called *euripi* sometimes surrounded the arena. An awning (*velarium*), supported by ropes and pulleys from strong masts set in stone sockets around the top of the building, appears to have been sometimes extended over the spectators. When the weather did not permit the *velarium* to be spread, broad-brimmed hats or a sort of parasols were used. The first amphitheatre in Rome seems to have been that of M. Curio, described by Pliny. It consisted of two wooden theatres made to revolve on pivots, in such a manner that they could by means of windlasses and machinery be turned round face to face, so as to form one building. Gladiatorial shows were first exhibited in the forum, and combats of wild beasts in the circus; and it appears that the ancient custom was still preserved till the dictatorship of Julius Cæsar, who built a wooden theatre in the Campus Martius for the purpose of exhibiting hunts of wild beasts. Most of the early amphitheatres were merely temporary and made of wood; such as the one built by Nero at Rome, and that erected by Atilius at Fidenæ in the reign of Tiberius, which gave way during the games and killed or injured 50,000 persons. The first stone amphitheatre was built by Statilius Taurus, at the desire of Augustus. This building, which stood in the Campus Martius near the Circus Agonalis, was destroyed by fire in the reign of Nero, and it has therefore been supposed that only the external walls were of stone, and that the seats and other parts of the interior were of timber. A second amphitheatre was commenced by Caligula; but by far the most celebrated of all was the Flavian amphitheatre, usually called the Colosseum, which was begun by Vespasian and finished by his son Titus, who dedicated it A. D. 80, on which occasion, according to Eutropius, 5,000, and according to Dion, 9,000 beasts were destroyed. The following table has been compiled to show the proportions of some of the chief amphitheatres:



Amphitheatre at Verona.

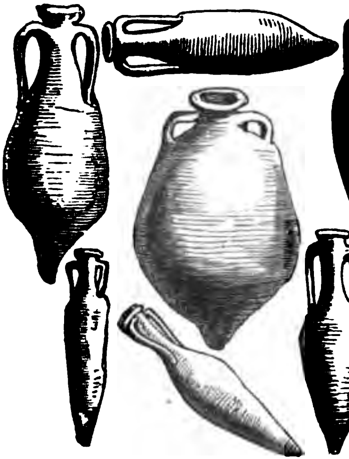
PLACES.	Length, feet.	Breadth, feet.	Length of Arena, feet.	Breadth of Arena, feet.	Height, feet.	No. of Spectators.
Rome (Colosseum).	615	510	281	176	164	80-100,000
Verona............	513	410	248¼	147	100	22,000
Vienne...........	508	436	...	...	...	....
Pozzuoli..........	480	382	336	138	...	25,000
Arles..............	459	338	316	130	55¼	25,000
Limoges..........	450	378	...	...	...	....
Nimes............	437	332	...	...	70	17-23,000
Pompeii...........	430	335	193	107	...	10-20,000
Poitiers...........	426	375	264	210	...	....
Pola...............	336	292	...	...	75	....

During the middle ages, the amphitheatres were used as castles or as quarries, according to the exigencies of the times; but, in spite of all assaults of man or time, their ruins are among the most stupendous monuments of Roman antiquity.

AMPHITRITE, a nereid or oceanid, the wife of Neptune and goddess of the sea, mother of Triton, Rhode or Rhodos, and Benthesicyme. Jealous of Scylla, she threw some magic herbs into the well in which her rival was accustomed to bathe, and thus transformed her into a monster with six heads and twelve feet. In ancient works of art Amphitrite is always distinguished from Aphrodite by a net which keeps her hair in order, and by the claws of a crab on her forehead.

AMPHITRYON, in Greek legends, a son of Alcæus and Hipponome. Having accidentally killed his uncle Electryon, he was expelled from Mycenæ, and forced to take refuge in Thebes. To win the hand of Alcmena, he undertook an expedition against Pterelaus and the Taphians, whose lands he seized and divided among his friends. He was subsequently married to Alcmena, and became by her the father of Iphicles. He was killed in a war which he and Hercules were carrying on against Erginus, king of the Minyans. His tomb was standing at Thebes in the time of Pausanias.

AMPHORA (Gr. ἀμφορεύς, from ἀμφί, on both sides, and φέρειν, to carry), a large two-handled vase, commonly made of earthenware, of various forms, but generally tall and narrow, with a contracted neck, and ending nearly in a point. It was used by the ancients to hold wine, oil, the ashes of the dead, &c.; and some have been found in excavating that had been used as coffins by dividing them in half lengthwise, putting in the body, and joining the parts.—The amphora was also a liquid measure among the Greeks and Romans, equivalent to about nine gallons with the former and six with the latter.



Greek and Roman Amphoræ. From Specimens in the British Museum.

AMPULLA, a Roman vessel, like a bottle, used for holding wine, oil, or water. The *ampulla Rhemensis* (*la sainte ampoule*) was a glass flask filled with holy oil, which, according to tradition, was brought down from heaven by a dove at the time of the coronation of Clovis, at Rheims, in 496. From the 9th century, if not before, down to Louis XVI., all the kings of France were anointed with the oil contained in the sacred ampulla. During the revolution the ampulla was broken and its fragments thrown away. A pious person preserved one of the pieces, and after the restoration of the Bourbons it was delivered to the archbishop of Rheims, with a little of the original oil, as was asserted. Charles X. was anointed from it, and the oil then failed.

AMPUTATION (Lat. *amputare*, to cut off), a surgical operation by which a limb or portion of a limb, or a naturally projecting part of the body, is removed. The cutting away of a tumor is spoken of as an extirpation or excision. Amputation is required where the part is injured or diseased to such an extent as to render it useless and inconvenient, or a source of danger to life if it be retained. For many centuries an operation of extreme danger in itself, and performed only in the most urgent cases, surgical advance has rendered it one of little risk, though of late years there has been a tendency to curtail its sphere by improvements in other departments of the science. It was at first performed by a division of all the parts at the same level, and only through a joint. About the 1st century the practice of amputating between the joints was introduced, and also the very important principle of dividing the bone at a higher level than the soft parts, that the cut surfaces of these latter may be joined together over the bone and unite in that position. Formerly the great source of danger was the hæmorrhage which took place during and after the operation; to prevent which the parts were divided with red-hot knives, or the cut surfaces treated with heated irons or boiling liquids, in order to produce a charring of the tissues and plugging of the mouths of the vessels. A band encircling the limb, to restrain the bleeding during the operation, was used as early as the 1st century, but its permanent arrest was for a long time effected only by the means already mentioned. The band, applied ignorantly, failed of its complete purpose, and the inevitable separation of the eschars produced by hot bodies in many cases opened afresh the vessels, and hæmorrhage and death were the result. The use of the ligature in amputation, especially as its proper application was developed, rendered the operation comparatively safe. The honor of its introduction is probably due to Ambroise Paré in the 16th century. If the ligature was employed in these cases by Celsus, it fell into immediate disuse; and even the teachings of Paré and his school were unable for many years to bring it into general favor. The invention of the tourniquet by Morel and its perfection by Petit, in the 17th and 18th centuries, still further diminished the dangers. When it is done for a disease, it is spoken of as a pathological amputation; when for an injury, it is named "primary" or "secondary," according as it is performed before or after the occurrence of the inflammation which is induced by the violence done to the part. During the inflammatory period the operation is contra-indicated except for some very urgent reason. The deaths following primary amputations are somewhat fewer in number than those after secondary, except in the case of the thigh. Where done for disease, the mortality is very much less. No rule in surgery is better established than that the death rate increases as we approach the trunk. An amputation of the leg is less dangerous than of the thigh, and that through the lower part of the thigh less than through its upper part. Moreover, an amputation through the upper extremity is less grave than one through a corresponding part of the lower extremity.—In performing amputation, the patient is placed under the influence of an anæsthetic, which by its abolition of pain and much of the terror diminishes the shock to his system, and enables the surgeon to operate more carefully and on a part deprived of motion. The circulation through the main artery is arrested by pressure with the finger or the tourniquet. The skin and muscles are then cut by a series of sweeps of the knife round the circumference of the limb, the parts being drawn toward the trunk by an assistant as each one is completed. In this way, as the bone is approached, the parts are divided at a higher and higher level. The bone is then sawed, the sharp edges or corners being rounded off so as not to press upon the part. The chief arteries are treated in such a way as to close their open extremities. This may be done by grasping the end with the forceps and twisting it several times, which is called torsion; or by pressure with a needle passed through the muscles and over or through the vessel, called acupressure; or, most usually, by tying it with a ligature, which consists of a well waxed string of silk or other material. The tourniquet is then removed, and the small vessels which bleed are treated in the same way, provided the contact with the air does not cause them to contract. The soft parts are then drawn over the end of the bone and stitched together. The method of cutting the soft parts described above is known as the circular. What is called the flap operation may be performed by transfixion, cutting from within outward, or by cutting from without inward. In either case a single or a double flap may be made. This latter process may be rendered intelligible by taking a circular piece of paper and folding it along one of its diameters. The centre of the circle would represent the situation of the end of the bone, and the circumference the margins of the skin which are stitched together. If the cut surfaces grow together at once, there is said to be primary union. This result is but seldom attained, at least throughout, and as a rule the union is secondary, in which case suppuration takes place, and granulations spring up which grow together and fill up the wound. —For the accidents which may occur after amputation, see GANGRENE, HÆMORRHAGE, NECROSIS, OSTEO-MYELITIS, and TETANUS.

AMRITSIR, or **Umritsir**, a town of the Punjaub, Hindostan, between the Ravee and the Beas, an affluent of the Sutlej, 36 m. E. of Lahore; pop. about 130,000. There is in the town an extensive tank, built, or rather restored, in 1581, by Ram Das, the 4th Guru or holy man of the Sikhs, the name of which—Amritsir, the pool of immortality—was in the course of time transferred to the whole town. In the centre of the pool is a temple sacred to Govind Singh, the last of the Gurus. Amritsir is a place of considerable trade, one of the commercial depots of N. W. India. It is an open town, but Runjeet Singh built a fort there in 1809.

AMRU IBN EL-AAS, one of Mohammed's early proselytes, died in 663. He belonged to the Koreishites, and in early life was furiously opposed to Mohammed, ridiculing him in epigrams and satirical verses, and even attacking those of the new faith who had settled in Abyssinia. At last, however, he was converted, and his zeal in behalf of his new faith was as uncompromising as his opposition had been. The first two successors of the prophet, Abu Bekr and Omar, were chiefly indebted to his valor for the conquest of Syria. He carried his conquering arms into Egypt, and, at the head of only 4,000 men, took Pelusium and founded Old Cairo. He soon laid siege to Alexandria, and distinguished himself as much by his personal bravery as by his skill and conduct as a general. He was present in the assault, and in an attack on the citadel was taken prisoner with a faithful slave. Brought before the commander of the fortress, his slave, striking him in the face, ordered him to be silent in the presence of his betters; and this device saved his life by leading his conquerors to suppose him a person of no rank. He was sent back to the Mohammedan camp, with a proposition for a truce. This was refused, and the city was taken with a loss to the Arabs of 23,000 men. Amru spared the city, but the orders of Omar subsequently caused the conflagration of the library. Amru became emir of Egypt, and his firm government conciliated the inhabitants. He projected a canal for uniting the waters of the Nile with the head of the Red sea. Having been recalled by Caliph Othman, the Alexandrians in his absence revolted, and surrendered the city to the Greeks. Amru returned, and once more reduced the city and spared the inhabitants. The caliph Moawiyah owed his accession to Amru, who declared for him in preference to his rival Ali.

AMRU'L-KAIS, or **Amrulcais**, an Arabian poet, author of one of the seven *Moallacahs*, poems of the pagan pre-Mohammedan era, which were suspended to the Caaba, whence their name (pl. *Moallacat*, suspended). He was an opponent of Mohammed, and wrote satirical verses against him. Lette published the *Moallacah* at Leyden in Arabic, and Sir William Jones the English translation (London, 1782). The poem is purely imaginative. It was republished, together with other productions of the poet, by Baron MacGuckin Slane (Paris, 1857), and also by Arnold, in the *Septem Moallacât* (Leipsic, 1850).

AMSDORF, Nikolaus von, a German reformer, bishop of Naumburg, born near Wurzen, Saxony, Dec. 3, 1483, died at Eisenach, May 14, 1565. He was educated for the church, and early acquired distinction in theology. He seems to have been the confidant of Luther, and attended him in some of his early trials as a reformer. He was a sort of apostle of the reformation, going to Magdeburg (1524), to Goslar (1528 and 1531), and to the principality of Grubenhagen (1534), as the expounder and defender of the principles of the reformation. He was fond of controversy, and this peculiarity more than once involved him in personal difficulties with his friends. He contended that good works were not only not necessary, but prejudicial to salvation. In the attempt to secure concord between the Lutherans and the Zwinglians (1536), Amsdorf violently opposed the movement, probably on account of his personal hostility to Melanchthon. In 1542 he was appointed bishop of Naumburg, and was consecrated by Luther, who boasted of the uncanonical manner in which the service had been performed, as he himself says, "without suet, lard, tar, grease, or coals." This involved him in a contest with Von Pflugk, who had been regularly appointed by the chapter to the same office. Amsdorf was a violent opponent of the Augsburg Interim, and was one of the leaders in the adiaphoristic controversy.

AMSLER, Samuel, one of the greatest German engravers, born at Schinznach, Switzerland, Dec. 17, 1791, died in Munich, May 18, 1849. He passed several years in Rome, and in 1829 was appointed professor of engraving in the academy of Munich. He made a great number of fine engravings from Michel Angelo, Raphael, Schwanthaler, Thorwaldsen, Kaulbach, Overbeck, and other artists.

AMSTEL, a small river of the Netherlands, in the province of North Holland, formed by the union of the Drecht and Mydrecht. It passes through the city of Amsterdam, entering it on the S. E., and, after a winding northerly course of 10 miles, uniting with the Y.

AMSTERDAM, the largest city of Holland, capital of the kingdom of the Netherlands and of the province of North Holland, situated on the S. bank of the Y, an inlet or arm of the Zuyder-Zee, where that is joined by the river Amstel, 10 m. E. of Haarlem and 31 m. N. N. E. of the Hague; lat. 52° 22′ N., lon. 4° 53′ E.; pop. in 1870, 281,805, mostly of the Dutch Reformed church, and including about 60,000 Catholics, 36,000 Lutherans, 4,000 Anabaptists, 1,000 Remonstrants, 28,000 German and about 3,000 Portuguese Jews. It is one of the most remarkable cities in the world, resembling Venice in the intermixture of land and water, but much larger than Venice, and the canals, being lined with quays, present scenes of animation and enterprise. At the beginning of the 13th century it was but a small fishing village, subject to the lords of Amstel. It was constituted a town in the middle of that century; was taken possession of by William III., count of Holland, in 1296; fortified in 1482; was for a long time strongly Catholic (the Protestant citizens having been driven out by the duke of Alva), and joined the confederation of the United Provinces in 1578. Free toleration was now granted to all sects and religious beliefs, and with additional privileges granted to it in 1581 by the prince of Orange, and the ruin of its rival city Antwerp by the closing of the Scheldt in 1648, it soon reached a highly prosperous state, and has since advanced with but few interruptions, owing chiefly to wars with England, till it is at present one of the wealthiest cities in the world. The form of the city is that of a crescent, the arms projecting into the Y, and thus forming the port. The enormous dams thrown up since 1851 resist the influx of the sea into the canals, and are provided with floodgates of the strongest construction to withstand the pressure of high tides. They form the east and west docks, capable of holding 1,000 vessels. The principal mouth of the Amstel divides the city into two parts. The land side was formerly surrounded by walls, now replaced by a ditch 30 yards wide lined with trees, which make a pleasant promenade. Some of the bastions are now occupied by windmills, the city relying for defence against attacks chiefly upon the facility with which the surrounding flat country can be flooded from the sea. Amsterdam stands upon flat, soft, marshy ground. The houses are built upon piles driven through this surface soil to the depth of 40 to 50 feet into a subsoil of clay or sand. The canals by which the city is intersected, and on which all heavy freights are transported, divide it into 90 islands, and are crossed by about 300 bridges. The city is about 10 miles in circumference. There are eight iron gates, each named after the town toward which it opens. The older portion of the city is irregularly built, and many of the streets are narrow and the houses poor. The newer portions are very handsome. The streets run in parallels along the former walls, and are consequently semicircular. In the centre of each is a canal, lined with clean paved quays, which are planted with trees. Three streets in this portion of the city are especially noteworthy for their length and breadth, and the elegance of the buildings which line them. These are the Heeren, Keizers, and Prinsen grachten.

Each is about 2 miles long and 220 feet broad. As with other streets, through the centre of each of these runs a canal. The principal shops of Amsterdam are in the Kalver straat, the Nieuwedijk, and the Warmoes straat. The bulk of the Jews live in true Ghetto style in the poorer grachten, or water streets, which are lively, particularly in the evening, but overcrowded and dirty. The houses of Amsterdam are built of brick, four, five, and six stories high, standing with their gables to the street; they are mostly entered by flights of steps in front, and are surmounted by forked chimney stacks. Many of the poorer people live in basements or cellars. Others live constantly upon the water, in apartments built upon the upper decks of their trading vessels. The most magnificent public edifice is the palace, formerly the city hall. It is built of stone, was begun in 1648, and completed in 1655; rests upon 13,659 piles, driven 70 ft. into the ground; and is celebrated for its great hall or ball room, which is 111 ft. long, 52 ft. wide, and 90 ft. high, lined throughout with white Italian marble, and for its magnificent chime of bells, playing automatically every hour. The next most remarkable building is the Nieuwe Kerk (new church), lighted by 75 windows, many of which are beautifully painted. It contains the tomb of Admiral de Ruyter. The judiciary hall, opened in 1836, is among the finest structures in the city. Other buildings are the new town hall and the new exchange, founded in 1845; the arsenal, built on the island of Kattenburg; and the Oude Kerk (old church), founded in the 14th century, which contains the tombs of many of the Dutch admirals, and an organ said to be second only to that of Haarlem. Among the more recent fine public buildings is the palace of industry, established in 1864. Churches are numerous. The Calvinists have 10, the Catholics 16, and the evangelical Lutherans 2, one of which with surroundings is represented in our engraving. Various other denominations have several churches. Amsterdam has a great number of excellent charitable institutions, there being upward of 40 under the charge of particular denominations, and others belonging to the city. There are also various excellent educational institutions, some denominational in their character, others general. The *Athenæum Illustre* has professorships of art, law, medicine, and theology, a school of anatomy, a botanic garden, and a free library. The city Latin school is a fine institution. There are besides medical and theological schools. The royal academy of fine arts was founded in 1820. There is a music school, a naval school, a royal Dutch institution for science, literature, and fine arts, and another private scientific and artistic association, called *Felix Meritis*, which is patronized with great liberality, has 400 members, and is in a very flourishing condition. Finally, there is a museum of pictures, founded in 1798, containing a very large collection of the works of Dutch masters, and a remarkable collection of prints, contained in upward of 200 portfolios. The city is governed by a senate or council elected by the people, and a burgomaster appointed by the king.—Amsterdam is more noted as a trading than as a manufacturing town, though it has numerous manufactories of tobacco, soap, oil, cordage, canvas, steam engines and machinery, &c. There are also refineries of sugar and salt, glass works, brew-

The Palace of Amsterdam.

eries, and distilleries; and ship-building is extensively carried on. The entrances and clearances of vessels in 1868 were about 3,000, with 850,000 tonnage; and the greater part of the foreign trade of Holland, which amounted in 1868 to an aggregate value of about $150,000,000, passes through the port of Amsterdam. The chief articles of export are butter and cheese; other exports consist of products of the rich Dutch colonies, refined and raw sugar, coffee, spices, tin, oil, dyes, colors, fruit, vegetables, and flowers. The exports to Germany and England are the most prominent. By the Amstel, the Zuyder-Zee, and various canals, Amsterdam has water communication with all parts of Holland; and its railroad connections are also very extensive. The Zuyder-Zee, formerly the entrance to the port, long since became too shallow for the navigation of ocean vessels, and a canal called the Nieuwe Diep was built, admitting large ships, and connecting Amsterdam with the North sea at the Helder. The navigation of this long ship canal, with its large locks shutting out the ocean tides, having been found inconvenient and expensive, a colossal plan has been formed and nearly executed of connecting the harbor and docks by a short cut through the isthmus of North Holland, digging a ship canal through the immense sand hills protecting Holland at its western shore against the North sea. This canal, with its breakwater extending far out into the sea, will be second only in magnitude to the Suez canal. A part of the machinery that was used there has been transported to Amsterdam, and is employed in its construction. At the same time the Zuyder-Zee is to be made dry, and the inlet or arm, the Y, on which the city is situated, converted into dry land. Upon this a union railroad depot is to be constructed, where all the railroads will meet, and also the ocean vessels in the surrounding canals and docks.

AMUCK (Javanese, *amoak*, to kill). The running amuck is a Malay custom. The natives by a long-continued and excessive use of opium at length have their features sharpened, their skin drawn over their bones like parchment, and become entirely and ferociously mad. Armed with their formidable creese or dirk-knife, they rush in frenzy from their houses, sometimes naked, and leaping along the crowded streets, stab, bite, and curse every one who chances to be in their path. As soon as a person is seen in this state everybody in terror proclaims the news, and the cry of "Amuck" rouses the population like the cry of "Fire" or "Mad dog" in western cities. Every man snatches the first weapon that comes to hand, and follows the path of the common enemy. Long spears are, however, the favorite and more common weapon, and with these they pen the wretched maniac into a corner, and lance him to death as they would a tiger. Scores of persons are sometimes killed by one of these madmen before he can be checked.

AMULET (Ar. *hamalat*, a thing worn), a preservative against occult and mischievous influences. Amulets are made of various substances, and were first known, it is believed, among the Arabs. The early Christians made amulets of the supposed wood of the cross, or of ribbons with a text of Scripture written on them, and to this day the Roman Catholics call their little relics, &c., amulets. The idea that an amulet carried about the person has the power both of repelling and healing diseases still prevails in the mind of many persons. Even the celebrated Robert Boyle (who flourished in the latter half of the 17th century) does not hesitate to declare that he once experienced the efficacy of such an amulet in his own case. The anodyne necklace, made of beads from the roots of white bryony, which is sometimes hung around the neck of an infant for teething purposes, is an instance of the still surviving confidence in the medical virtue of amulets. Many other examples might be given.

AMURATH, or **Murad**, the name of several Turkish sultans. **I.** Born in 1326, died June 15, 1389. He succeeded his father Orkhan in 1360 in the government of the Turkish dominions in Asia. The first act of his government was to put down an insurrection in Galatia, after which he turned his attention and his arms to Europe. Here he overran the country as far as the Balkan, and took Adrianople (1361), where he fixed his residence for a time, beautifying the city by the construction of a mosque and other public buildings. In 1365 a treaty of peace was concluded between the Ottomans and the republic of Ragusa, on the Adriatic, which put itself under the protection of Amurath. Pope Urban V., alarmed by the progress of the Ottomans, preached a crusade against them, but the Turks surprised the Christian forces by night near Adrianople and cut them to pieces (1368). The peace which Amurath had concluded with the Greeks, and which had been observed by him, being thus broken, he continued the war for several campaigns without any decided results, and went to Asia in 1371. Soon returning to Europe, he vanquished the princes of Servia and Bulgaria, and settled at Adrianople. During a peace of six years he employed himself in organizing his army, and formed the corps of spahis, instituting a system of military fiefs as the reward of their services. In this there was considerable analogy with the feudal system, and possibly he was assisted by renegade Christians in his plans. The Greek emperor, John Palæologus, seeing himself unable to cope with the new power arrayed against him, entered into friendly alliance with Amurath, and sent his son Theodore to his court to learn the art of war. The sons of the two emperors entered into a conspiracy against their fathers, and levied an army. Amurath advanced alone to the ranks of his rebellious son and ordered the soldiers to return to their duty. Unable to resist the mandate of their terrible ruler, the men obeyed, and Amurath put his son Saudji to death (1375). In Asia Minor he had to contend with several insurrections. Lazarus, prince of Servia, in conjunction with Sisman, prince of Bulgaria, Amurath's father-in-law, renewed the effort for independence, and during Amurath's absence in Asia gained several advantages over his generals in Europe. The arrival of Amurath, however, turned the tide of victory, and at length he took Sisman prisoner, whom he deposed and confined. Lazarus, however, continued his resistance, and the armies met on the high plains of Kosovo, between Novi Bazar and Pristina. Amurath, under the influence of a dream that he had been assassinated, was at first unwilling to hazard an engagement, especially as his troops were far inferior in numbers to the Servians. But the counsels of his son, the fiery Bajazet, prevailed, and the signal for the engagement was given. After a bloody contest the Servians were totally defeated at all points, and Lazarus himself was taken prisoner. Amurath examined the field after the battle, and while congratulating his attendants upon the victory was struck by the hand of a wounded Servian. The wound was mortal, and Amurath's dream was accomplished. The Servian fell under the blows of the janizaries, but sold his life dearly. He proved to be Milosh Kobilovitch, son-in-law of Lazarus. Before expiring, Amurath, who is otherwise renowned as equally generous and wise, ordered the execution of Lazarus. **II.** Born about 1404, died Feb. 9, 1451. He was the son of Mohammed I., and in 1421 succeeded his father on the throne. He at once concluded an armistice for five years with Sigismund, king of Hungary and Bohemia, and emperor of Germany. Manuel, the Greek emperor, refused to conclude a peace unless Amurath gave his two brothers as hostages, failing which he threatened to set at liberty Mustapha, son of Bajazet Ilderim, the legitimate successor to the throne. Amurath refused, and the Greek admiral, Demetrius Lascaris, was at once sent to land Mustapha near Gallipoli, to which Demetrius laid siege. Mustapha himself advanced toward Adrianople with a constantly increasing army, and encountered Amurath's troops under Bajazet Pasha, who laid down their arms on his making himself known to them, and Bajazet was taken prisoner and put to death. Mustapha, however, was soon afterward betrayed to Amurath and executed. Manuel, now alarmed for himself, sent an embassy to the sultan to settle terms of peace. Amurath, however, was not to be appeased. He appeared with a powerful force before Constantinople in 1423, and increased his army by a proclamation of his intention to abandon the city and all the booty to the assailants. The assault was at length made, and the city was in deadly peril, when, according to Greek writers, a beautiful virgin dressed in a white robe appeared in mid air, and threw the Mohammedan army into such a panic that Amurath was obliged to retire. On the death of Manuel (1425) a treaty was concluded with John Palæologus, his successor, by which the Greeks consented to pay tribute to Amurath, and surrendered several towns on the Black sea and on the Strymon. The treaties of peace with Wallachia and the emperor Sigismund were also renewed. In 1429 Amurath made himself master of Thessalonica, and in 1431 of Janina. Notwithstanding the armistice between Amurath and Sigismund, their friendship was only superficial; and Amurath, who had suppressed the revolts of Caramania and Servia, and made satisfactory arrangements with other provinces of his growing empire, turned his attention to the politics of central Europe, and endeavored to influence the election of Casimir, son of the king of Poland, as king of Bohemia. Failing in this, he laid siege to Belgrade (1439), which was defended by the Hungarian warrior, John Hunyady. Amurath was repulsed, and the Ottoman arms now sustained a long series of reverses from the invincible Hunyady. Amurath at last purchased a 10 years' truce of the Hungarians by great sacrifices. The death of his son Aladdin, to whom Amurath was tenderly attached, now plunged him into such distress of mind that he abdicated in favor of his son Mohammed, who was only 14 years of age (1442), and retired to Magnesia, in Asia Minor. The Christians, in the belief that their opportunity had now arrived, broke the solemn peace, for which the papal legate gave them absolution, and poured into the Turkish dominions under the command of Ladislas, king of Poland and Hungary, and his general, Hunyady. Amurath was recalled from Magnesia, and forced to take the command of the army. Hoisting the treaty at the end of a lance, he encountered the Christians (1444) at Varna, on the Black sea. In a personal contest he dismounted Ladislas, whose head was cut off and displayed on a lance to his soldiers. Affrighted at the sight they fled, notwithstanding the efforts of Hunyady to restore the battle. Again Amurath sought retirement, and was again called out to put down a revolt of the janizaries. Hopeless of gratifying his wish for ease, he marched against Greece. After subduing the Morea, and putting it to tribute, he encountered stubborn resistance in Albania from the heroic George Castriota (Scanderbeg), who, with the assistance of the Venetians, was able to postpone for a time the fall of his native country. A new irruption of Hunyady into Servia compelled Amurath to retire from Greece, and a battle was again fought on the plains of Kosovo, in October, 1448, in which the Hungarian army, after a desperate defence of their intrenched camp for three days, was entirely routed with prodigious loss. Amurath did not long survive this crowning victory, dying suddenly of apoplexy, on an island near Adrianople. **III.** Born in 1545, succeeded his father, Selim II., in 1574, died Jan. 17, 1595. His first act was to put his five brothers to the bowstring. His reign is signalized in Turkish history by the arrogance with which the Turks treated the representatives of the European powers. The ambassadors were compelled to observances of etiquette degrading to their sovereigns, and the agents of the embassies were subjected to personal indignity, the dragoman of France having been compelled to embrace Islamism. In the reign of Amurath III. the plague ravaged Turkey and Italy. The war with Austria was continued, and a war which had commenced with Persia was terminated in 1590 by a treaty which secured to the Porte the possession of Luristan, Georgia, Shirvan, Tabriz, and part of Azerbaijan. A depreciation of the coinage resulted in a revolt of the janizaries, who demanded the heads of two officers of state, whom they charged with having been the authors of the depreciation. This revolt extended itself throughout the Turkish empire, and laid the foundation for the disorder and insubordination which rendered the janizaries so celebrated. The war with Austria continued with varying success until the end of his reign. **IV.** Born in 1611, succeeded his uncle Mustapha, Sept. 1, 1623, at the age of 12, died Feb. 8, 1640. At the commencement of his reign the empire was in a state of the most deplorable disorder. The provinces were rent by insurrections and revolts; the capital convulsed by the constant mutinies of the janizaries, who were not to be pacified, save by an increase of pay or by the abandonment of some unfortunate vizier to their brutality; war was desolating the frontiers of the empire. Assuming the sceptre at so early an age, Amurath had little power to amend the state of his kingdom, but with experience came a vigor which was destined to make the hardiest tremble. In 1638 he commenced the siege of Bagdad, which had long resisted the efforts of the ablest Turkish generals. On Dec. 24 the assault was made, and the city of the caliphs passed from the Persians to the Turks. The garrison of the citadel capitulated, but not evacuating the city at the hour promised, 30,000 Persians were massacred. Although in the early part of his reign Amurath had promulgated strict laws against the use of wine, he afterward abandoned himself to the most outrageous drunkenness; and his fits of delirious rage while intoxicated were so terrible that his people, his soldiers, and ministers all dreaded to enter his presence.

AMUSSAT, Jean Zuléma, a French surgeon, born at St. Maixent, department of Deux-Sèvres, Nov. 21, 1796, died May 14, 1856. He commenced his career as a sub-assistant surgeon in the French army, and afterward became assistant surgeon at the hospital of La Salpêtrière, under Esquirol, and prosector at the faculty of medicine of Paris. He invented and improved as many as 30 different surgical instruments, and was the first to show the importance of twisting a bleeding artery to arrest the hæmorrhage, and also to point out the danger of phlebitis from the admission of air into the veins during an operation. His most important works are: *Recherches sur le système nerveux* (1825); *Tables synoptiques de la lithotripsie et de la cystotomie hypogastrique* (1832); *Recherches sur l'introduction de l'air dans les veines* (1832).

AMYGDALOID, a rock containing almond-shaped cavities. The term is for the most part limited to rocks of the trap variety. The vesicular cavities in these, as in the lavas, are the result of the escape of gases, as the rocks cooled down from a melted state. Subsequently to their formation the cavities have generally become filled with some mineral, as calcareous spar, quartz, agate, chlorite, or a zeolite.

AMYL (Gr. *ἄμυλον*, starch), C_5H_{11}, the radical of amylic alcohol or potato spirit, a colorless liquid, with a somewhat aromatic odor, prepared by Frankland in 1849 by heating the iodide of amyl with an amalgam of zinc in sealed tubes for some hours at a temperature of from 320° to 356° F. It also occurs as an incidental product in the distillation of coal. As it doubles its molecular constitution whenever attempts are made to isolate it, the liquid described by Frankland is now commonly called diamyl, and the formula written $(C_5H_{11})_2$. Amyl, or rather diamyl, has the specific gravity of 0·77 at 60° F., boils at 311° F.; becomes thick at 22° F., but does not freeze; takes fire when heated and burns with a smoky flame; mixes in all proportions with alcohol, but not with water; is not acted upon by fuming sulphuric acid, but slowly attacked by nitric and nitro-sulphuric acid, and decomposed after long digestion with pentachloride of phosphorus. Amyl by itself has no use in the arts, but is interesting to the scientific chemist on account of the great number of substitution products that have been derived from it.—Nitrite of amyl is an inflammable liquid, lighter than water, and having an odor like very ripe pears. It produces in man, when inhaled in the dose of three or four drops, a sudden and violent acceleration of the pulse, with a peculiar flushing of the face. In animals it is capable of producing death. It may be regarded as a powerful general sedative, the peculiar action on man being due to a rapid relaxation of the muscular walls of the arterioles, giving rise to a suddenly diminished pressure of the blood in the arteries and heart. Its therapeutic applications are not yet extensive, but it has been used with good effect in angina pectoris, and some other diseases of a supposed spasmodic character.

AMYLENE, a transparent, colorless, thin liquid, with the odor of decaying cabbage, boiling at 102° F., vapor density 2·43, sp. gr. 0·65. It is produced by the dehydration of amylic alcohol by sulphuric acid or phosphoric acid. It was discovered in 1844 by M. Balard, by heating a solution of chloride of zinc with amylic alcohol or fusel oil, and in a compound of 5 atoms of carbon with 10 of hydrogen. In its preparation a concentrated aqueous solution of chloride of zinc is heated to 266° F. with an equal volume of amylic alcohol, and the product distilled from a water bath over caustic potash and repeatedly rectified. It is very volatile, mixes with alcohol and ether, burns with a beautiful white flame, combines directly and energetically with bromine, the hydracids, and chloride of sulphur, and its vapor is rapidly absorbed by sulphuric anhydride and perchloride of antimony. Amylene is the third homologue of olefiant gas or ethylene, and like the latter is the starting point of a multitude of compounds which are derived from it by addition, substitution, or subtraction. An attempt was made to substitute it for chloroform as an anæsthetic in surgical operations; but this use has been abandoned, as its employment has in a few cases led to fatal results.

AMYNTAS, the name of three Macedonian kings. **I.** The son and successor of Alcetas, reigned from 537 to about 498 B. C. During his reign Megabazus, the general of Darius, sent ambassadors to demand from Macedonia earth and water, the tokens of submission. The weak Amyntas gave them at once. He even invited the Persian envoys to a magnificent banquet, and when, heated with wine, they brutally ordered him to give up to them his wives and daughters, he would have had the baseness to obey; but his son Alexander disguised as women several pages of the court, who, when brought to the Persians, murdered them with their daggers. **II.** Nephew of Perdiccas II., died in 369 B. C. He actually inherited only Upper Macedonia, but after contesting the sovereignty of the whole country first with his brother, who defeated him with the aid of foreign allies, and afterward with the usurper Pausanias, he became king of all Macedonia in 393. He was again driven from his throne by Argæus, son of Pausanias, and only recovered it with the help of the Thessalians. He entered into a lasting alliance with Sparta. **III.** Grandson of the preceding, succeeded, when yet an infant, his father Perdiccas III., 360 B. C., but was in the following year deposed by his uncle Philip II., and put to death on the accession of the latter's son, Alexander the Great, who charged him with conspiring against his life (336).

AMYOT, Jacques, a French author, bishop of Auxerre, born at Melun, Oct. 30, 1513, died at Auxerre, Feb. 6, 1593. After many arduous struggles with poverty and obscurity, he succeeded in acquiring some reputation as a teacher; and through the patronage of the sister of Francis I., Margaret of Berry, he was made professor of Greek and Latin in the university of Paris. Subsequently he obtained the abbacy of Bellozane, and visited Rome to gather materials for the translation of Plutarch and other Greek writers, and took part in the council of Trent. On his return to France he became tutor of Henry II.'s two younger sons, the future kings Charles IX. and Henry III., under the former of whom he was raised to the offices of grand almoner and curator of the Paris university, and ultimately to the bishopric of Auxerre. The most celebrated of his works, which chiefly consist of translations, is the version of Plutarch.

AMYRAUT, Moise, a French Calvinist theologian, born in 1596, died in July, 1664, at Bourgueil, in the province of Anjou. He was educated at Saumur, where he was afterward a professor of divinity. By his talents and moderation he soon acquired reputation and influence. In 1631 he attended the synod of Charenton, and was commissioned to present to the king a remonstrance against the infraction of the edicts of pacification. In fulfilling this mission he procured the abrogation of the humiliating requirement that Protestant deputies should address the king only on their knees. He endeavored to bring about a complete union between the various Protestant churches, which he advocated especially in a Latin tract, *De Secessione ab Ecclesia Romana, deque Pace inter Evangelicos in Negotio Religionis instituenda.* The favor and respect with which he was treated by the heads of the French government, Richelieu and Mazarin, are to be ascribed to his opinions concerning the power of princes; he publicly maintained on several occasions the doctrine of implicit obedience to the sovereign authority. Among his numerous writings, now nearly forgotten, though popular in their time, are treatises on Christian morals, on the natural laws of marriage, against indifferentism, and against the Millenarists.

ANA, as a prefix, a Greek word signifying over again, against, and the like. Its use is exemplified in Anabaptist, anachronism, and analysis. As a suffix, it is the Latin termination of the neuter plural of an adjective of three terminations; thus *Ciceroniana* would be the matters of any sort appertaining to Cicero. In the literature of the modern European nations, it alludes to the collections of the sayings or anecdotes of celebrated wits. The first collection of this kind was the *Scaligerana*, published at the Hague in 1666, by Vossius, in Latin. The next of the ana was the *Perroniana*, in French, being notes of the conversations of Cardinal Duperron (1669). *Menagiana* and *Thuana* are also celebrated collections in French. French literature of the 17th century is particularly rich in this department. The ana mania lasted about half a century. In English, the "Walpoliana" is the best. German literature is not rich in personal memoirs; the *Taubmaniana* is the most famous, and we have also the *Melanchthoniana*. In England, the records of the prize ring are called "Fistiana" and "Boxiana." American literature does not much affect this species of title.

ANABAPTISTS (Gr. ἀναβαπτίστης, a rebaptizer), a name sometimes applied to all those sects of modern times of which rebaptism has been a distinguishing mark. The justice of the appellation has never been acknowledged by those to whom it has been applied. In receiving converts to their communion, they administered baptism, not as repeating the sacred rite, but as a valid baptism, in place of one which was imperfect or void. Thus, the Baptists repel the name Anabaptists, not, as some suppose, for the mere purpose of repudiating an alleged connection with the fanatics of the reformation, but because it does not represent correctly their practice. They baptize, as they allege, according to the original institution of the rite, and therefore claim to be Baptists; they never repeat baptism in the case of any who, in their judgment, have been so baptized; and they therefore deny that they are Anabaptists. It may be doubted whether the word, as now applied to Baptists, is not always intended as a reproach; certainly it should be excluded in that application from respectable modern literature, as giving an unnecessary offence.—The title belongs historically to large classes of people who sprung up in various countries of Europe during the period of the reformation. Though applied to them against their remonstrances, it has become fixed in literature as a historical term, and is too convenient for practical purposes to be expelled by any considerations of critical justice. Whether these various classes agreed or not in things more essential; whether they were furious and fanatical, or gentle and pious; whether setting up mock kingdoms by force of arms, or conscientiously abstaining from the use of arms altogether, they were alike in the visible thing of repeating baptism, and hence were designated by a common name, and too often visited with common penalties and maledictions. It is the business of the historian to discriminate between these classes, to look beyond names for historical facts, and to redeem from the reproach of many generations great numbers of people whose faith was in essential harmony with the faith of Protestantism, whose lives were pure, and whose deaths were a rare and honorable martyrdom. In this historical discrimination something has been already effected. Illustrations generally accessible may be found in Burnet's "History of the Reformation in England," Brandt's "History of the Reformation in the Netherlands," Mosheim's "Institutes of Ecclesiastical History," and especially in the "Dutch Martyrology," published by the Hanserd Knollys society, London, under the editorial care of Edward B. Underhill.—Precisely when or where the Anabaptists of the reformation period first appeared, whether in Germany or Switzerland, it is difficult if not impossible to determine. They sprung up like rank vegetation, under sudden and refreshing rains, after drought and sterility. The solution of the problem is found in the fact that the seeds were in the soil. The better classes of them claimed a descent from the Waldenses, the Wycliffites, and the Hussites, who had struggled for a church separated from the world and distinguished by the holiness of its members. Consciously or unconsciously, ideas like these must have been working in the minds of multitudes in various countries. When, therefore, the reformation came, opening the Bible to the people, announcing its revelations as the highest law, and inviting the human mind to freedom of thought, these principles acquired sudden and prodigious force. Ardent minds, bent in the direction of a primitive Christianity, and of a social order corresponding thereto, were dissatisfied with the partial reformation which contented Luther and Zwingli, and demanded more. This demand, sharpened by discussion, became a popular movement, and, pushed to its last development, took the opposite directions, on the one hand, of a wild, ungovernable, and licentious fanaticism, subversive of all social order, and on the other, of a mystical though sincere and genuine piety, characterized by some harmless eccentricities of faith and by separation from the world. These parties, so diverse in character and tendencies, went under the common name of Anabaptists, because they were distinguished by the common, visible badge of rebaptism.—The usual references in illustration of the character of the furious Anabaptists are the following: In 1521 they made their appearance at Zwickau, and, accepting as their leader Thomas Münzer, took part in the peasants' war, and shared its sanguinary results. Münzer and his associates are represented as having claimed a divine commission not only to establish a community of holy persons, but also to extirpate magistrates by the sword. He excited his followers to revolt against the civil authorities, and assured them of the immediate deliverance of Christendom from the grievous oppressions of its rulers. They were totally defeated, May 15, 1525, near Mühlhausen, and the leaders were put to death. Itinerant prophets still, however, spread the principles of the sect. They declaimed against the wickedness of the times, and demanded a community of saints, without distinction of rank or office. They claimed an internal light, which was of more value than learning in interpreting divine revelation. No Christian might exercise the functions of a magistrate or take an oath. Property was to be shared in common among the faithful. In 1533 they began to concentrate their operations at Münster. John Matthias of Haarlem and John Boccold of Leyden were their leaders. They had gained over to their cause Rothmann, the preacher who introduced the reformation into that city, and Knipperdolling, a leading citizen. Seizing the arsenal and the senate house, they placed Matthias at the head of affairs, and his authority became arbitrary and complete. The inhabitants were trained to military duty, the fortifications were strengthened, and the faithful were invited to come from every quarter to aid the struggles and share the triumphs of Mount Zion, from which they were to proceed to the conquest of the world. Count Waldeck, prince and bishop of Münster, surrounded the city with an army. Matthias sallied out and gained signal advantages. His fanaticism rose with his success, and, issuing forth again with only 30 followers relying on their spiritual pretensions, was with all of them put to death. John Boccold was now raised to the throne of David, in obedience to divine commands made known in visions. He wore a crown, clothed himself in purple, coined money, and appointed judges. But the fanaticism, when it had reached the height of spiritual folly, passed by an easy transition to license and sensuality. The obligations of matrimony were declared invasive of spiritual liberty, and freedom of divorce and licentiousness followed. King John himself multiplied his wives, honoring, however, one of them only as his queen. The example of the monarch was not lost upon the people, and the name of Münster during the reign of the Anabaptists has passed to history as the synonyme of unbridled and indecent lust. The city was taken June 24, 1535, after a brave defence, in which Rothmann was slain. John Boccold, and Knipperdolling and Krechting, leading associates, were tortured with red-hot pincers, and then hung up in iron cages, which are still preserved in Münster. Thus in 15 months perished the kingdom of the Anabaptists. Even now, however, the delusion did not cease. It subsided indeed into its more spiritual character, and its excesses were chiefly individual and local. But the fanaticism of this class of Anabaptists remained the reproach of the reformation, and the terror of civil society.—There was another class of Anabaptists, widely different from those who have been described. In some instances, undoubtedly, when the former class fell back upon their purely spiritual views, the two parties coalesced. Brandt refers to an instance in which the moderate were brought into difficulty by being found in such association with the fanatical. The distinction, however, is real, and may be traced. It is a mistake to suppose that the rejection of infant baptism during the reformation was found among the unlearned only. Melanchthon, Zwingli, and Œcolampadius were all troubled by the questions which arose respecting the adjustment of this rite to the personal faith required by Protestantism. Some of those who became leaders of the Anabaptists were the associates and equals of these reformers. Mantz, Grebel, and Hubmeyer were men of learning—the last of great genius and eloquence. Mantz had been the friend and fellow student of Zwingli, and was an early martyr in the cause of the Anabaptists, Zwingli himself pronouncing his sentence in the words, "*Qui iterum mergit, mergatur.*" The persecution of such men and their followers in Switzerland shocked the moderate of all parties. In expressing his views of this persecution, Erasmus pays a tribute to the character of the sufferers in these words: "A people against whom there is very little to be said, and concerning whom we are assured there are many who have been reformed from the worst to the best lives; and though, perhaps, they may foolishly err in certain opinions, yet have they never stormed towns nor churches, nor entered into any combinations against the authority of the magistrate, nor driven anybody from his government or estate." These people, so persecuted, demanded a church composed of spiritual persons, introduced into it by a voluntary baptism. They demanded likewise the separation of the church from the state, and the non-interference of the magistrate in matters of religion. Anabaptists of the same class were found in the Netherlands in large numbers. The record of their sufferings, their martyrs multiplied by thousands, furnishes a melancholy and affecting chapter in human history. William of Orange, founder of the Dutch republic, was sustained in the gloomiest hours of his struggles by their sympathy and aid, and has left his testimony to their loyalty, industry, and virtue. That great prince, however importuned, steadfastly refused to persecute them. The same class were found in England during the reign of Edward VI., and Burnet declares that books, not flames, were used in reply to their arguments.—One of the doctrinal peculiarities of the Anabaptists, which seems to have been almost universal among them, related to the origin of the human nature of Christ. They denied that he took his flesh of Mary, explaining his incarnation by a higher miracle. Doubts have arisen, on the one hand, as to whether they believed in the reality of his human nature, and on the other, as to whether they believed him to be a divine person. The records of the examination of some of them before the courts ought to remove all questions of this kind. They believed fully in his complete humanity, and their answers show that their questionings in regard to the origin of his human nature did not necessarily imply any departure from the common views of his divinity. Menno Simonis became their chief leader, and the instrument of their organization into a recognized body of Protestant Christians. Mennonites and Anabaptists have from his time been interchangeable terms, and the communities so called have descended to the present age. (See Menno Symons, and Mennonites.)

ANABAS SCANDENS (Cuv.), an acanthopterygious fish, of the family of *labyrinthibranchidæ*, and the only species of the genus. This family, which has been known from remote antiquity, is remarkable for the peculiar structure of some of the pharyngeal bones and for the serrations of the gill covers. The palate is toothless; the jaw teeth are villiform, the outer ones the strongest; the lower is toothless in front, but far back among the three superior pharyngeals the teeth are crowded, conical, and large. The head is round and wide, and its scales, as well as those of the body, are large, hard, and strong; the dorsal and anal fins are of nearly equal height; the branchiostegal rays are six. The inferior and three posterior upper pharyngeals are of the usual form, and provided with teeth; but the two other upper pharyngeals on each side are dilated into thin and convoluted laminæ, capable of retaining a considerable amount of water; this labyrinth communicates with the gills by a small opening which may be entirely closed. The water enters this cavity every time the fish opens its mouth, and may be retained for a considerable period. A fish dies out of water, not from immediate want of oxygen, but because the gills become dry and improper for its transmission. The anabas can live many hours and perhaps days on the land, as the water contained in its pharyngeal receptacle trickles slowly over the gills and keeps them moist at the will of the animal, which leaves the rivers and pools, and crawls by means of its fins and tail considerable distances. Another peculiarity of this fish is the number of sharp spines which project from the edge of the operculum and suboperculum, the latter being uncommonly movable. The specific name is derived from its alleged habit of climbing trees, which it is said to do by fixing its opercular spines in the bark, flexing its tail, and fastening the spines of the anal fin; then detaching the head, it throws itself forward, to recommence the planting of the anal spines. It certainly moves on land in this way, and may perhaps ascend low trees, though this is denied by some writers. It inhabits the streams and pools of India and the Indian islands, living principally on aquatic insects; it is used as food, though small and full of bones; it grows from 6 to 10 inches long. It is brought alive to the Calcutta markets from a distance of over 150 miles; from its being found at a great distance from water, the natives believe that it falls from the heavens.

ANABASIS, a Greek word signifying originally ascension, then a campaign or march from a lower to a superior region; for example, from the shores of a sea to the interior of a country. In this signification the word forms the title to two historical works of antiquity: the one, by Xenophon, describing the anabasis or campaign of Cyrus the Younger against his brother Artaxerxes II., and the celebrated retreat of the 10,000 Greeks, auxiliaries of Cyrus, from the battlefield of Cunaxa, where that prince perished, to the shores of the Euxine; and the other by Arrian, relating the anabasis or campaigns of Alexander the Great.

ANABLEPS, a genus of soft-rayed fishes of the carp family (*cyprinidæ*), so named because the division of the cornea and iris by transverse ligaments gives the appearance of double eyes, from the dumb-bell-shaped pupil. The lens, retina, and vitreous humor are single. As one half of each eye apparently looks upward and the other half downward, they have been popularly called four-eyed fishes. The *A. Gronovii* or *tetrophthalmus*, of Surinam and Cuyuni rivers, is about 10 inches long, with a cylindrical body and strong scales, flattened head, and blunt snout with the upper jaw the longer. This genus is also viviparous, but the vascular adhesion of the embryonic membranes is ruptured long before the birth of the young, instead of at the time of exclusion as in mammals; the gestation is almost wholly ovarian. (See Fishes.)

ANACHARSIS, a Scythian philosopher who made his appearance at Athens in the early part of the 6th century B. C. He became very intimate with Solon, and was so esteemed for his virtue, learning, and sagacity, that some ranked him among the seven wise men. He was made a citizen of Athens, and is said to have been even initiated into the Eleusinian mysteries. According to Herodotus, he was killed by his brother after his return to his native country. Many of the sayings of Anacharsis have been preserved by Diogenes Laërtius, Athenæus, and other ancient writers.

ANACLETUS. I. A saint and pope of the Roman church, according to some, the second after St. Peter, and a martyr under Domitian in 91; according to others, martyred about 109, having succeeded Clement I. as the fifth bishop of Rome. **II.** An anti-pope, whose original name was Peter de Leon. He was said to be of Jewish descent, was born in Italy, and educated at the university of Paris. He entered the order of Cluny, and was afterward cardinal and legate of Pope Calixtus II. both in England and France. He was elected pope in 1130 by a portion of the cardinals in opposition to Innocent II., and was sustained by the Romans, Milanese, and Sicilians. In spite of the arms of the emperor Lothaire and the opposition of other sovereigns and of the clergy generally, Anacletus maintained himself at Rome till his death, Jan. 7, 1138.

ANACONDA (*eunectes murinus*, Wagler), a large serpent of the boa family, found in most parts of intertropical America. The genus *boa*, which contains the large American serpents, has been made to include many species which do not belong to it, among others the anaconda; and we find accordingly this species named *boa scytale*, *boa murina*, *boa gigas*, and *boa aquatica*, by various authors. The genus *eunectes* may be distinguished from all others of the boa family by the nostrils opening at the upper part of the end of the muzzle, and looking directly upward; this peculiarity, added to their very small size, the little space between them, and

Anaconda (Eunectes murinus).

their crescentic form, which allows them to be completely shut, indicates the aquatic habits which we know characterize the anaconda. Other generic characters are the three plates which surround the nostrils, the plates which cover the anterior half of the top of the head and the scales which cover it posteriorly, the flat and smooth scales of the body, and the undivided plates on the under surface of the tail. The head is comparatively small, conical, very flat below, and truncated in front; the body is considerably larger in the middle than at either extremity; the tail, less prehensile than in the boas, forms about one sixth of the total length. The eyes, which are small, are so placed that the animal can see at the same time objects above and before it, a provision common to all water serpents. The mouth is perfectly straight, and armed with strong teeth gradually diminishing in size in the four series; the number is 16 on each side in each jaw, 5 on the palate, and 10 on the pterygoid bones. The scales of the body are lozenge-shaped, and nearly of the same size, except those of the sides, which are two or three times larger than the rest; on the trunk there are about 60 longitudinal and 375 transverse rows; on the tail there are over 80 transverse and about 36 longitudinal rows. The plates or scutellæ of the abdominal region are very narrow, and about 250 in number, and of the tail from 60 to 78. The colors are simpler than in the boas, being blackish green above in the adults, and olive brown in the young; on the temples, between two lines of pure black, is a wide yellow band extending obliquely from the eye to behind the angle of the mouth; the back and tail present large oval disks of deep black, disposed in two series alternating with each other, and occasionally coalescing; along each side is a single or double row of black rings contrasting finely with the yellow ground color; the color beneath is ochre yellow with black quadrangular spots, isolated or confluent. The anaconda is the largest serpent of America, and is only equalled in size by some of the pythons of the old world; it is occasionally seen in museums 20 feet long, and it probably attains a considerably larger size, though the accounts of travellers are generally much exaggerated in this respect. The Guianas and Brazil are the favorite and perhaps the exclusive resorts of the anaconda. It lives mostly in the water, and is fond of shallow places, where it remains with all but the head submerged watching for its prey; it swims rapidly, in an eel-like manner, and can pass a long time beneath the surface; it is occasionally seen floating lazily with the current; it is also in the habit of stretching itself on the sand or on the rocks, on a river's bank, or along the trunk of a fallen tree, where it lies in wait for animals which come to drink. Its ordinary food consists of agoutis, small rodents, iguanas, fish, and occasionally a monkey, sloth, or ant-eater; it crushes its prey in its strong folds, and, seizing it with its teeth, swallows it very slowly, head first. The time of impregnation is the winter months, when the natives attack it with guns, arrows, and even clubs; it is sluggish in its motions on land, and timid, and not at all feared; it is very tenacious of life. The natives use the skin for shoes and bags, the fat for the purposes of oil, and the flesh for food. It is ovoviviparous. Only one species of the genus is described.

ANACREON, a Greek lyric poet, born at Teos in Ionia about 561 B. C. When that city was taken by the Persians, about 540 B. C., he emigrated to Abdera in Thrace, whence he afterward went to Samos, and spent several years at the court of Polycrates. On the death of Polycrates he was invited to Athens by the tyrant Hipparchus, who sent a vessel for him. Here he formed an intimacy with Simonides and other poets. He left Athens probably on the murder of Hipparchus in 514, and died in the 85th year of his age, but the place of his death is uncertain. He is said to have been choked by a grape stone. We possess only a few genuine fragments of the poems of Anacreon. His favorite themes were love and wine; his distinguishing characteristics licentiousness, gracefulness, and fervor. The best editions are by Fischer (3d ed., Leipsic, 1793) and Mehlom (Glogau, 1825), and of the separate fragments that of Bergk (Leipsic, 1834).

ANADYOMENE (Gr., emerging), a surname given to a picture of Venus rising from the ocean. Apelles was the first who painted her in this posture as she rose from the sea, and was drying her hair with her hands. This picture was bought by the inhabitants of the island of Cos, and put in their temple of Æsculapius. The emperor Augustus bought it of them for the remission of 100 talents tribute, took it to Rome, and placed it in the temple of Venus Genitrix. In Nero's time it was nearly washed out, and was repaired.

ANADYR, or **Anadir.** **I.** An extensive gulf or sea of Asia, at the N. E. extremity of Siberia, lying between Cape St. Thaddee and Cape Tchukotskoi, of late years much resorted to for whales. **II.** A river of Siberia, having its source in Lake Yoanko in the Stanovoi mountains, about lat. 66° 30′ N., lon. 173° E. It traverses the central portions of the Tchuktchi country in N. E. Siberia, flows first W., then E., and after a course of about 500 m. falls into an inlet of the gulf of Anadyr. The country through which it passes is rocky and barren, and covered with snow about nine months in the year.

ANÆMIA. See BRAIN, DISEASES OF THE, and CHLOROSIS.

ANÆSTHETICS (Gr. *ἀν*, privative, and *αισθάνομαι*, I feel), substances which can produce a general or partial suspension of nervous sensibility. In the common acceptation of the term should be included all drugs which have the faculty of so acting upon the brain that this effect can be caused; for instance, all the forms of narcotics and diffusible stimulants.

But by general consent this title is now confined to the most volatile forms of chemical agents which can produce the effect when inhaled or applied externally, and the effects of which are transitory; the terms narcotization and coma being applied where a long-continued effect is caused by other agents. The general action of all anæsthetic agents is through the medium of the blood, into which they are taken either from the lungs, the stomach, or by the skin, and carried by the circulation to the brain, where they produce a profound but transient state of intoxication. Anæsthesia is said to be either general or local: general, when all power of sensibility is suspended; local, when only a particular part of the body is affected, the brain and the rest of the system remaining as ordinarily. Loss of sensation in restricted portions of the body has been attempted in various ways, as by long pressure upon the nervous trunks leading to the part, first put in operation by Ambroise Paré, afterward adopted by Dr. Moore, about 1784; the application of carbonic acid gas, recommended by Dr. Hickman in 1828, a procedure which was revived by the late Dr. Simpson; the application of the various ethers, especially chloroform; and by a true freezing of the part, as recommended by Dr. James Arnott of London, who employed for the purpose a mixture of pounded ice and common salt enclosed in a muslin bag. The most useful method has been found to be the employment of ether spray, directed in a continuous stream upon the part by means of an atomizing apparatus. Various anæsthetic agents have been employed at different times —the several kinds of ethers, nitric, acetic, sulphuric, &c., protoxide of nitrogen ("laughing gas"), aldehyde, olefiant gas, naphtha, carburetted hydrogen, Dutch liquid, benzoin, chloroform, and amylene, a substance introduced by Dr. Snow of London; but none of them have proved so successful, or are now so generally used, as sulphuric ether and chloroform. This latter substance was discovered in 1831, but its chemical composition was not accurately known till 1834. (See CHLOROFORM.) Its use for the same purpose as sulphuric ether was first proposed by Dr. J. Y. Simpson of Edinburgh, in 1847. The advantages claimed for it over ether are the smallness of the dose required, a more perfect action, less depression when the heart or lungs are diseased, a more rapid effect, less disgust to the patient during inhalation, absence of persistent odor, and lastly, that it is cheaper. But as unfortunately it has happened that several deaths have occurred from its use, it cannot be looked upon as so safe an agent as ether, from the use of which, no matter in how large quantities or how carelessly, not one death has yet been reported. The benumbing of the nerves of sensation by the administration of narcotic drugs has been practised for many years, and, as records show, was known to the ancients; but with the exception of certain traditions as regards the use in the East of the mandrake (*atropa mandragora*) and hashish (*cannabis Indica*) in the form of vapor for this purpose, we have no proofs that anæsthetic inhalation was ever employed. Richard Pearson recommended the inhalation of sulphuric ether for asthma, &c., in 1795; and in 1816 Nysten described an instrument for its use. In Sir Humphry Davy's "Researches concerning Nitrous Oxide," published in 1800, is this remark: "As nitrous oxide in its extensive operation seems capable of destroying physical pain, it will probably be used with advantage during surgical operations in which no great effusion of blood takes place." Dr. J. C. Warren of Boston prescribed ethereal inhalation for the relief of pulmonary inflammation in 1805, and Mr. Wesley Smead of Cincinnati published an article on this treatment in 1822. The power of the ethers to produce insensibility was mentioned by Godman in 1822, Mitchill in 1832, Prof. Samuel Jackson in 1833, and Wood and Bache in 1833. But its application as an agent for the relief of pain during surgical operations was first publicly made at the Massachusetts general hospital in Boston, Oct. 16, 1846, by Dr. W. T. G. Morton of that city, who subsequently secured a patent for the use of the article under the name of "letheon." On Jan. 2 of the next year a new claimant for the discovery came before the public, in the person of Dr. Charles T. Jackson of the same city; and still later the same claim was advanced in behalf of Dr. Horace Wells of Hartford. (See JACKSON, MORTON, and WELLS.)—The objects gained by the administration of anæsthetics are various, according as we have to do with surgery, midwifery, or medicine. In surgery: 1. A protracted and careful examination, and consequently more accurate diagnosis, can be made in many cases of disease and injury, where the intense pain caused by the examination prevents the manipulation of the surgeon, as in fractures, dislocations, and stone. 2. From the total relaxation which the muscles receive under a full dose, the reduction of many forms of dislocation, herniæ, &c., is facilitated. 3. In military service, under its influence, men can be removed to a distance where the operation can be conveniently performed, instead of as formerly being obliged to operate upon the field of battle or in places otherwise unfavorable. 4. The general use of many forms of remedial operation is extended, which otherwise are attended with such exquisite agony that they were rarely resorted to unless from most extreme necessity, as for instance the application of the actual cautery and moxas. 5. Many operations can now be performed for the relief of long-continued disease, or after injury, which before would have been hazardous, owing to the depressed or feeble state of the patient. 6. Many delicate operations can now be easily performed where perfect quiet is demanded of the patient, and which can hardly be afforded by any amount of exercise of the will, as in operations upon the eye, dissection of nerves, or the taking up of arteries. 7. Patients will now apply earlier than heretofore for relief in surgical diseases, the dread of the surgeon's knife often having induced them to postpone it until the case became almost hopeless. 8. The mortality from operations has materially decreased, for it is well known that pain has a serious tendency to depress the nervous system and produce death from exhaustion.—In midwifery: 1. In addition to preserving the mother from the pain always incident to parturition, we have the power of preserving her strength unimpaired when the labor is long continued or especially severe. 2. In all cases of instrumental labor or those requiring manual assistance, the aid can be afforded with greater ease to the accoucheur and more safety and less accompanying suffering to the mother. 3. Many cases in doubt in diagnosis can be more correctly solved. 4. From the relaxation of the muscular fibres, the exit of the child through the uterine neck or the vaginal passage, when they are rigid, is facilitated. 5. Anæsthetics have the power of keeping in abeyance and reducing the violence of one of the worst complications of labor, puerperal convulsions. 6. The recovery of the patient after labor is assisted, and the chances of subsequent dangers lessened.—In medicine: 1. As a relief from severe or exhausting pain in disease, as from toothache, passage of calculi, or neuralgia. 2. As a narcotic in mania, delirium tremens, excitement, or wakefulness from any cause. 3. As an antispasmodic for cholera, hysteria, asthma, convulsions, &c. They have also been employed in the treatment of many inflammatory diseases, fevers, &c. They are found very useful in the detection of feigned diseases, as affected paralysis, dumbness, or contraction of limbs. They have been sometimes employed for nefarious purposes in cases of violence, where a struggle or noise was feared.—The first effects of all anæsthetics, or when they are taken in small quantities, is exhilarating and intoxicating as from any diffusible stimulant, evidenced by bursts of laughter, hysterical weeping, or loud unmeaning talk. When long continued or in large doses, there ensues a general feeling of warmth, extra power, and excitement generally, first felt in the extremities, soon followed by a prickling benumbed sensation, with confusion of ideas, noises in the ears, usually compared to the vibration of an engine from one side of the head to the other, and flashes of light before the eyes. This is soon followed by loss of sensation and voluntary motion, and total coma. The patient is generally observed to become a little flushed in the face, the veins of the forehead turgid, the eyes suffused and staring open, and the pupils dilated. The pulse is generally increased at the commencement of inhalation, but becomes decreased often lower than natural when the system is fully under the influence, which is the time chosen for the performance of all great surgical operations. The respiration, which is slightly quickened at first, becomes slower and deeper in the somnific state. The temperature of the body remains generally of the ordinary standard, but becomes slightly reduced when the influence is long continued. The effects of the anæsthetic generally disappear soon after the administration is discontinued, and the patient returns to consciousness with merely a slight tendency to sleep and dizziness, and with no recollection of anything which has happened during the inhalation. Sometimes, however, the recovery is attended with nausea or vomiting, which most often happens when the drug is taken on a full stomach; for this reason it should not usually be given until several hours after a meal has been eaten. No person has yet been found to withstand the influence, but the effect is seen much sooner and more quietly in some than in others. Anæsthetics should not generally be used in diseases of the heart or brain, or when there is excessive degeneration of the lungs. When, from an over-dose or the inattention of the giver, the patient seems likely to sink, and respiration is suspended, the vapor should be removed from the mouth at once, the patient laid in a reclining position, free access of air allowed, cold water dashed upon the chest and face, and, if necessary, artificial respiration made, sinapisms placed on the feet, and galvanism used.—Many instruments have been devised for inhalation, but, as often happens, the simplest means is usually the best. The most advisable plan for administering is to fold a coarse towel into the form of a small cone, and place in the bottom a small sponge containing the liquid. At the commencement the sponge should be held at a small distance from the mouth, and the patient be directed to inhale by deep and long-continued inspirations, notwithstanding the cough. As he gets more and more under the influence, it should be approached to the face, but it is imperatively necessary that there should be a free admission of atmospheric air. Particular attention should be paid to the condition of the pulse. It is now generally conceded that chloroform is much more dangerous to life than ether. Ether should therefore be employed in preference, unless special circumstances make it imperative to select chloroform as the anæsthetic agent. If chloroform be used, it should be remembered that its vapor is heavier than the air, and consequently sinks; care should also be taken to guard the skin from its irritating properties by smearing slightly with oil or glycerine. If ether be used, care should be taken not to have any lighted candles or gas jets in the neighborhood of the patient, as the vapor of ether is exceedingly inflammable, and very serious consequences might result from its accidentally taking fire. The ratio of power of ether and chloroform is considered as about 8 to 1 in favor of the latter, this producing its effect in from 30 to 60 seconds, the former on an average in from 3 to 4 minutes. The dose of chloroform is from 30 drops to 1 oz.; that of ether is of almost any quantity, as much as two quarts having been employed in some long-continued and severe operations.

ANAGNI (anc. *Anagnia*), a town of Italy, about 40 m. S. E. of Rome; pop. about 7,500. Anagnia was one of the most ancient cities of Latium, the capital of the Hernici, and an early antagonist of Rome. It is the residence of some of the most powerful families of Italy, and it has given birth to several Roman pontiffs, among others to Gregory IX., Alexander IV., and Boniface VIII.

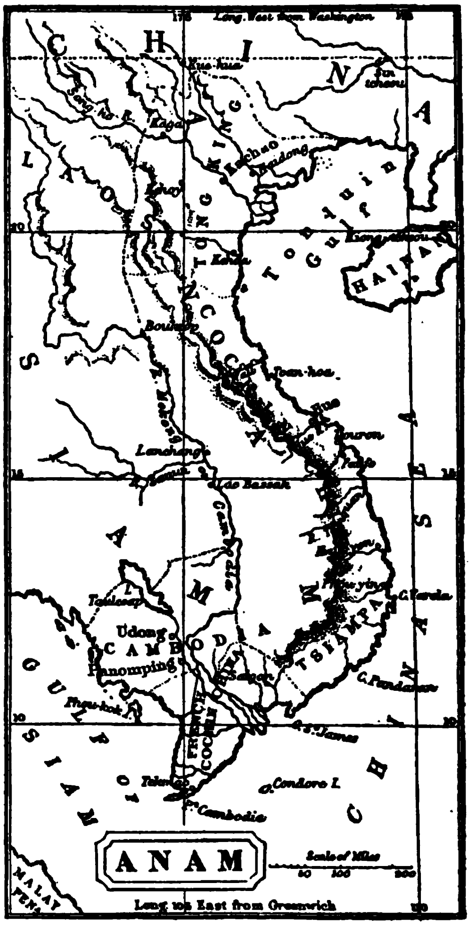
ANAGRAM (Gr. ἀνά, backward, and γράμμα, letter), the transposition of the letters forming a word or sentence into a new word or sentence having some bearing upon the subject of the former one; as, *Honor est a Nilo*, formed from the letters in the name of Horatio Nelson. To make a true anagram, every letter of the original words must be retained in the transposition, and no new one must be added. In ancient times anagrams were regarded as prophetic, or as embodying a direction to the man on whose name they were made; it is said that Pierre de St. Louis became a Carmelite monk on finding that his name, Ludovicus Bartelemi, could be transposed into *Carmelo se devolvet*. Satirical anagrams were very common in the 16th and 17th centuries; Camden, the English historian, devoted a treatise to them, and many of the most learned men spent their leisure in making them upon the names of their contemporaries. Perhaps the best anagram ever made is the one which transposes Pontius Pilate's question to Christ—*Quid est veritas?* (What is the truth?)—into the answer, *Est vir qui adest* (It is the man who is before you). The following are a few excellent anagrams: Arthur Wellesley, duke of Wellington—"Let well-foiled Gaul secure thy renown." Napoleon Bonaparte—"No, appear not at Elba." Louis Napoleon Bonaparte—"Arouse, Albion; an open plot." For some curious anagrams, and their history, see the introduction to "Macaronic Poetry," by James Appleton Morgan (New York, 1872).

ANAHUAC, an aboriginal name, signifying, in the Nahuatl or ancient Mexican language, by or near the water; from *att*, water, and *nahuac*, near. The name has come to be applied specifically to the valley, or rather the plateau of the city of Mexico, although in the early writers we find references to several Anahuacs; as, for instance, Anahuac-Ayotlan and Anahuac-Xicalanco, the latter applied to the district around the lake or lagoon of Xicalanco in Tabasco. From the circumstance of their having established themselves originally around the lakes of Chalco and Tezcuco, the traditional tribes of Mexico have been called Anahualtecas, people living by the water. It is alleged that these tribes came from some northern region, supposed by some to have been from Asia by way of Behring strait, and that the ruins of ancient edifices, known as *casas grandes*, in New Mexico and Chihuahua, mark the path of their migration. It is, however, known to critical students that their original seats, figuratively represented as seven caves, were somewhere in the vicinity, probably on some of the islands, of Lake Michoacan; and that when they reached the region of Anahuac, they were simple barbarians, clothed in skins and living by the chase. Around the lakes of Mexico, however, they found the feeble remnants of a people far advanced in civilization, agriculturists and architects—the Tulhuatecas, a name corrupted by uncritical writers into Toltecs. These Tulhuatecas were unable to resist the irruption of the seven warlike tribes, but gradually taught them agriculture and the arts, and thus laid the foundation of the Tezcucan and Mexican empires, in which civilization and barbarism, lofty religious precepts and the most cruel rites, were incongruously mingled. The Anahualtecas were precisely the people better known as Aztecs (see AZTECS); and the name of Anahuac is now only understood as applying to the plateau of the city of Mexico.—This great table land comprises three fifths of the territory belonging to the Mexican republic, and has an elevation of 4,000 to 8,000 feet above the level of the sea. E. and W. it is bounded by the two great chains of mountains into which the Cordillera of Central America is subdivided in its northward progress. Out of this plateau rise many lofty mountains, including the stupendous volcanoes of Jorullo and Popocatepetl, but it is generally level.

ANAITIS, or **Anahid**, an oriental goddess, anciently worshipped by the Lydians, Armenians, Cappadocians, and Assyrians. The classical writers identify her sometimes with Diana, sometimes with Venus, and she appears to have combined the attributes of both these goddesses. Her temple was magnificent, her statute golden, her worship most lascivious.

ANALYTICAL GEOMETRY, a branch of mathematical science which consists in the application of algebra to geometry. It may be divided into three parts, according to the branch of geometry to which the algebra is applied. 1. Applying algebra to elementary geometry, it furnishes means for the easy solution of the most intricate problems, the simplification of demonstrations, the finding of constructions, the discovery of new propositions, &c. 2. The application of algebra to the conic sections and other curves has simplified this study and greatly expanded the knowledge of the higher geometry, which treats of other curves than the circle. 3. Its application to the system of coördinates in space, invented by Descartes, gave birth to a new view of the geometry of space, simplifying and expanding largely that branch called stereometry. 1st. In the solution of geometrical problems by algebra the figures are drawn as if the problem was solved, and if necessary, such additional lines as may establish known relations between the different quantities; then the known and unknown quantities are expressed by letters of the alphabet, and the relation between them are, if possible, expressed in algebraic formulas or equations; these, rightly treated after the rules of algebra, give in the end an expression in known quantities equivalent to the unknown quantities. The results indicate the solution, either a manner of construction or a new geometrical relation, or it reveals an unknown property or theorem. 2d. In order to apply algebra to curved lines in general, use is made of the method of coördinates invented by Descartes. It consists simply in accepting two lines drawn through one point, by preference perpendicular one to the other, and defining the position of any point by its distance from either line or coördinate; these distances are respectively called the abscissa and ordinate, and customarily expressed by the signs x and y. Selecting now such a point successively at various places of an arbitrary line, there will be a certain relation between these distances, that is, between x and y, which may be expressed by an equation; the simplest equation is $y = ax$, or $y = ax + c$, which is an equation of the first degree, and the equation of the straight line. If the line is a parabola, the equation will be of the second degree, and in its simplest form is $y = ax^2$, or $y = ax^2 + c$. All the other conic sections can be expressed by equations of the second degree. Every curved line has in this way its corresponding equation of the third, fourth, or some other higher degree; for instance, the so-called cissoid corresponds to the equation $y^2 = (a + x)^3 + (a - x)$. 3d. But the grandest application of this ingenious method of expressing positions of points was the next step made by Descartes of constructing coördinate planes, being three planes intersecting at one point, by preference at right angles, forming thus a trihedral angle. (See ANGLE.) The position of any point in space is thus determined by its distance from each of these three planes or faces of the angle. In such case there are of course three distances to be considered, x, y, and z, requiring two equations to determine the nature of a line. For instance, $y = ax + c$ and $x = cz + d$ is the equation for a straight line in space, while $y = ax^2 + c$ and $x = cz^2 + d$ represents the equation of a parabolic curve of double curvature, that is, one which cannot be laid on a plane surface, but a parabola drawn on a parabolic surface. Of course the number of different curved lines is as infinite as the number of different possible equations. This part of analytical geometry has given rise to the foundation of a much simpler but very useful and practical branch, by the great French mathematician Monge, namely, descriptive geometry.

ANAM, or **Annam**, sometimes called from one of its provinces COCHIN CHINA, an empire occupying the eastern portion of the Indo-Chinese peninsula, between lat. 8° 30′ and 23° 30′ N., and lon. 100° and 109° E., and bounded N. by China, E. and S. by the China sea, W. by Siam, and N. W. by Burmah; area about 200,000 sq. m.; pop. probably about 15,000,000. Before the French conquests (1859–'62) the empire included three distinct provinces and part of a fourth, Cambodia. Tong-King or Tonquin, the largest province, occupies the northern part and borders on China; Cochin China proper, or Dang-Trong, extends southward in a narrow strip along the eastern coast; Tsiampa forms a continuation of this strip still further south; while that portion of Cambodia formerly belonging to Anam extends to the delta of the Cambodia river. Besides these provinces, a portion of the territory occupying the mountainous centre of the Indo-Chinese peninsula, and inhabited by the Laos and Moi tribes—primitive peoples living under patriarchal chiefs of their own—is also under the dominion of Anam; but as these tribes are also tributary to Siam and other countries, and as they profess allegiance now to one, now to another, the extent of the Anamese dominion is indefinite. A considerable range of mountains extends



through the whole length of the empire, parallel with the eastern coast, and about 30 m. distant from it. From these flow numerous rivers, which, though generally too shallow for easy navigation, thoroughly irrigate the country. The great river Mekong or Cambodia, emptying into the China sea and gulf of Siam by many mouths, richly fertilizes that part of Cambodia formerly subject to Anam, but now under French rule as a part of French Cochin China. Throughout the southern part of Anam, but especially near this delta, the country produces great abundance of rice, sugar, spices, and tropical fruits. The mountains supply excellent timber for ship-building, besides ebony and other valuable woods. The inhabitants of the northeastern coast live in great part from the product of the fisheries.—The Anamese are a people somewhat akin to the Chinese in language and in many of their most important customs; but they also partake largely of the Malay characteristics, and evidently form a link between the Mongolian and Malay races. They are generally quiet and inoffensive, indolent and fond of gayety. They wear their hair long and gathered in a knot on the top of the head, have little beard, and dress in simple frocks and wide trousers of cotton or silk. Many Chinese merchants live among them, and carry on commerce, which the natives neglect, in rice, indigo, and silk. The last the Anamese manufacture with considerable skill, but they have few other industries. Their religion is professedly Buddhism, and the higher classes even adopt Confucianism; but they are not a religious people. The social customs of the Anamese are very similar to those of the Chinese; but though the women are much oppressed, they are not obliged to live in seclusion. Weddings and funerals are celebrated with great ceremony. The mountain tribes already noticed claim to be the aborigines, and have their own religions and customs. (See LAOS.)—Anam is governed by an emperor with absolute power; and under him are the mandarins, or officials, forming a nobility sharply distinguished from the body of the people. Embassies are annually sent to Peking, but Anam no longer pays tribute to the Chinese empire. Mandarins appointed by the emperor govern the provinces, and control the standing army, which is comparatively large. The capital of the country is Hué, at the mouth of the river of the same name.—The early history of Anam is involved in obscurity. It is only known that frequent wars with neighboring powers determined its boundaries, and that the empire was formerly entirely subject to China. In the latter half of the 13th century Marco Polo visited the country. The Portuguese were the first Europeans who actually resided there. In the 17th century, when Anam was in its greatest prosperity, the Jesuits introduced Christianity, and propagated it with such energy that by the close of the 18th century French priests had converted the emperor, Gya-Long, and established a hierarchy of great influence. The succeeding emperors, however, rejected its doctrines and persecuted priests and converts. The present emperor, Tu-Duc, has especially opposed Christianity; and the murder of several missionaries between 1854 and 1858 seemed to the French government a sufficient cause for revenge, while it served as a pretext for the acquirement of a French colony in the East. In 1858 a French fleet, assisted by several Spanish vessels, captured Turon, a town near the capital, Hué. In 1859 the French took Saigon, an important town on the river Saigon. After an obstinate resistance on the part of the Anamese, who succeeded in prolonging the war for four years, the French, who had taken many towns and the whole province of Saigon, dictated terms of peace by which they became possessors of that province as well as of Bienhoa and Mytho; these remain in their possession and form, under the name of Cochin China, the only important French colony in the East. (See COCHIN CHINA.) By the treaty, three ports in Tonquin were opened, and Christianity was permitted throughout Anam. An insurrection took place in December, 1862, but it was quelled by the French.

ANAMBOE, a seaport town on the Gold Coast of Africa, 10 m. E. of Cape Coast Castle; pop. about 5,000. It is the seat of considerable trade, and formerly had a large traffic in slaves. The British fort here is the strongest on the coast. The exports are gold dust, ivory, palm oil, and peanuts; and the imports are silks, tobacco, wines, guns, and cutlery.

ANANIAS, the name of three persons mentioned in the Acts of the Apostles. **I.** A disciple at Jerusalem, who, having sold his property for the common cause, conspired with his wife Sapphira to give in a part of the price and reserve the rest, representing that he gave all. Peter is related to have discovered the impious fraud at once, and the Holy Ghost to have avenged it by striking both the deceivers dead. **II.** A devout man who dwelt at Damascus, and who is recorded to have been warned in a vision to go and find Paul, and restore him to sight, after he had been struck blind at his conversion. According to tradition, he was afterward bishop of Damascus and a martyr. **III.** A high priest before whom Paul was brought for trial at Jerusalem, and who commanded Paul to be smitten on the mouth (Acts xxiii). Paul being sent from this tribunal to Felix, Ananias among others went up to accuse him of being "a pestilent fellow and a mover of seditions," &c. He was, according to Josephus, nominated to his office by Herod, king of Chalcis, A. D. 48, sent to Rome in 52 to answer before Claudius a charge of oppression brought forward by the Samaritans, at a later period deposed, and finally assassinated at the beginning of the Jewish war.

ANASTASIA, the name of several saints of the Roman and Greek churches. **I. Anastasia the Elder** was a martyr of the time of Nero, a pupil of St. Peter and St. Paul. Her festival day is April 15. **II. Anastasia the Younger,** of an eminent Roman family, was brought up in the Christian faith by her mother Flavia, persecuted by her heathen husband Publius, and finally burned in Aquileia, in 303. Her day is Dec. 25. **III. Anastasia,** the daughter of an eminent Greek family of Constantinople, attracted by her beauty the attention of the emperor Justinian. She resisted his dishonorable proposals and retired to Alexandria, where she lived for 28 years as a monk, her sex remaining unknown till her death in 567. Her day is March 10.

ANASTASIUS, the name of four popes. **I. Saint,** occupied the Roman see 398–402. He was contemporary with Jerome, Chrysostom, and Augustine, and is remarkable for having condemned various axioms and writings of Origen. Several letters by him are extant. **II. Saint,** pope from 496 to 498. A letter from him to Clovis on his conversion and some fragments on the eastern schism are preserved. **III.** From 911 to 913. His rule was gentle, but no details of his life are known. **IV.** From July 9, 1153, to Dec. 2, 1154. He had previously been greatly distinguished as governor of Rome, and as pope favored the knights of St. John of Jerusalem.

ANASTASIUS, the name of two emperors of Constantinople. **I.** Surnamed Dicorus, born about 430, died in 518. He was a member of the lifeguard (*silentiarii*) of the emperor Zeno, on whose death in 491 he was proclaimed emperor through an intrigue with the empress Ariadne, whom he soon afterward married. Though more than 60 years of age, he began his stormy reign by suppressing with great ability a rebellion organized against him by Longinus, Zeno's brother, who had aspired to the throne, and by two other natives of the Isaurian province, whose names were also Longinus. Rebellions, plagues, earthquakes, and a severe famine filled the next years of his reign with hardship for the people and difficulty for the emperor; and finally the Persians under their king Cabades invaded the empire with such success, that Anastasius was compelled to purchase peace by an enormous tribute (505). In the opening years of the 6th century Anastasius became involved in the religious disputes of the time, and was anathematized by Pope Symmachus for favoring the Eutychian heresy. **II.** Originally named Artemius, chosen emperor in 713 as successor to Philippicus, whose minister he had been. He began his reign by punishing Rufus, the traitor who had deposed Philippicus. In 715 he undertook an expedition against the Arabs, but it was rendered futile by the mutiny of many of the sailors of his fleet. The mutineers proclaimed as emperor one Theodosius, a government official, who besieged Constantinople and Nicæa, in which latter place Anastasius was when attacked. The latter was driven from the throne (716), and retired to a monastery, while the rebel became emperor as Theodosius III. In the reign of Leo III. Anastasius endeavored to regain the throne, but was defeated and put to death (721).

ANASTOMOSIS (Gr. ἀνά, through, and στόμα, mouth), the communication or inosculation of different blood vessels by opening one into the other. In the arteries it is comparatively rare, as these vessels divide and separate from each other, for the purpose of distributing the blood to different organs. Nevertheless, it always exists in certain situations, where the principal trunk is liable to compression, and where this compression would have the effect of shutting off all nourishment from the parts beyond were there no other means of vascular communication. Thus the arterial branches situated above and below the principal joints anastomose with each other; and if the main artery of the limb is compressed or tied, the blood still finds its way to the parts below by this circuitous route of communication. The arteries supplying the intestines also communicate freely with each other, so that the circulation is not interrupted by the folding or bending of the parts upon each other. The most remarkable instance of arterial anastomosis is that at the base of the brain, where the two principal arteries entering the skull from behind, namely, the right and left vertebral, unite in a single trunk, which afterward divides and sends branches forward on each side to inosculate with the two internal carotid arteries, which themselves afterward communicate with each other by a transverse anastomosis at the anterior part of the brain. Thus there is at the base a continuous vascular circle or ring, called the "circle of Willis," supplied with blood at the same time from four different arteries, the two carotids and the two vertebrals, and from which branches are sent off to the various parts of the cerebral substance. In the veins anastomosis is much more frequent, even the larger veins of the upper and lower limbs seldom continuing far in their course without giving and receiving branches of communication with adjacent veins. Thus a passage for the blood from the extremities toward the heart is constantly kept open, notwithstanding the compression to which these vessels are liable by the contraction of the muscles and accidental pressure. In the capillary blood vessels, finally, anastomosis is abundant and constant. All the capillary blood vessels, in fact, inosculate with each other in every direction, and in such profusion as to form a network or plexus of minute vessels, with corresponding interspaces or islets included between the meshes. This provides for a continuous and uniform supply of blood to every part of the organ, and brings the blood into close contact with the substance of its tissue.

ANATA. See Anathoth.

ANATHEMA (Gr. ἀνάθημα, from ἀνατίθημι, I set apart), in the Greek classics, anything set apart as an offering to the gods, applied to the numerous votive gifts which were suspended upon the walls of temples or exposed upon public altars. By change of usage it afterward became the name of anything devoted to the infernal gods, anything execrated and execrable, causing the abhorrence of men. In this sense it was adopted by the Christian church as the synonyme of the Hebrew *'herem*, which signifies both a thing devoted to God and extermination, and which was used by the Jews in pronouncing the ban of excommunication. The Old Testament gives many examples of *'herem* or anathema. Moses pronounced the anathema against those Canaanitish cities which should refuse to submit to the Lord, and Joshua declared everything captured in Jericho *'herem*, and punished Achan for violating the ban. In the New Testament it is used in the sense of "set aside" or "accursed." In the Roman Catholic church it is a sentence pronounced against heretics and schismatics, or against those who wilfully and obstinately persevere in a course of conduct which the church condemns. It implies exclusion from the communion and society of the faithful, who are taught to regard the object of this ecclesiastical penalty as one who by his crimes has cut himself off from the church and merited the flames of hell. The anathema, however, is not supposed to be a sentence of eternal reprobation; it is a temporal punishment, similar in its effects to excommunication. Most of the dogmatical decrees of the church close with anathemas against all who presume to deny them. Thus the council of Trent employs it against such as deny the existence of purgatory, the doctrine of the real presence, &c.

ANATHOTH, a town of ancient Palestine, the birthplace of Jeremiah, about 4 m. N. of Jerusalem. It was in the possession of the tribe of Benjamin, and a city of priests. It was once a considerable place, but is, according to Robinson, identical with the present Anata, an insignificant village. Anata is in the top of the high range of hills north of Jerusalem, and commands a prospect of the Dead sea. It was in Anathoth that Jeremiah bought the field (witnessed by Baruch), as a symbol of the return from the captivity.

ANATOLIA. See Asia Minor.

ANATOMICAL PREPARATIONS, the skeleton and other portions of the dead body preserved from decomposition by various artificial methods, for the use of medical schools or science. The soft parts are usually separated from the skeleton by long-continued maceration in cold water, or by steaming or boiling; the bones are bleached, and the articulations held together by means of wires. This is called an artificial skeleton, and, when properly prepared, may be kept for an indefinite time. To preserve the natural articulations of the bones, the soft parts must be removed carefully by dissection, and many delicate sections and mechanical adaptations are required to display the internal structure, forms, and relative proportions of the skeleton and its component parts. The whole body of an animal, or any soft portion of the body, such as the heart or the intestines, may be preserved for a considerable time in alcohol or in spirits of turpentine; and such preparations are very useful in the study of comparative anatomy. Another method of anatomical preparation consists of injecting the vessels with some colored substance to distend them, and display their ramifications in the organs, that the shape and course and relative dimensions of the vessels may be seen with ease. By means of a large syringe inserted into the main trunks of the arteries, these vessels are filled with a soft colored mass, which penetrates into the smallest branches, distends them, and makes them visible. The infused substance usually consists of a mixture of soap, pitch, oil, and turpentine, to which is added a coloring substance: red for the arteries, blue for the veins, and white for the absorbents or lymphatics. For the latter vessels quicksilver is preferred, on account of its extreme divisibility.—Dried preparations of the soft parts, such as muscles, nerves, and membranes, are preserved by covering them with a protecting coat of transparent varnish. The quicker they are dried, the better for this mode of preparation and conservation. Spirits of wine, distilled with pepper or a very strong pimento, and mixed with muriatic acid, is used for preserving them. Washing with pyroligneous acid gives firmness and whiteness to these anatomical preparations. Those which are preserved in liquids are usually kept in bottles of transparent glass, with accurately ground stoppers, to prevent evaporation, and secure them against the destructive influence of air, moisture, heat, dust, and insects.—Preparations of this kind are very necessary to preserve important specimens of normal and abnormal development in the animal economy, but they are difficult to preserve long in a comparative state of perfection. Other means have therefore been devised as substitutes for common use. Instead of anatomical preparations properly so called, anatomical imitations are now used for purposes of general instruction, and great perfection has of late years been attained in the manufacture of these works of art. Imitations of organic form and structure were formerly made in wood, as those of the abbé Fontana in the museum at Florence; or in wax, as those made by Laumonier and others in France and Italy; card-board, as by Dr. Ameline of Caen; or in lithographic drawings, woodcuts, colored prints, &c. Drawings, however perfect, are not sufficient for all purposes; and though the anatomical imitations of organs were sometimes made with rare perfection and beauty in wax, they were too expensive for common use, and could neither be taken to pieces for detailed inspection, nor handled freely without risk of injury. In 1825 Dr. Auzoux of France conceived the idea of making imitations of all the organs of the human body; not only of their general external form and appearance, but also of their internal and minute details. For this purpose he composed a pasty mixture of a sort of papier maché which may be moulded to any form while liquid, and hardened in the form thus given. Models of the organs were made in all their different layers and proportions, with the vessels and the nerves in each, as they are found in nature; the liquid substance was then poured upon the models and allowed to harden. A complete manikin of the human body and all the internal organs was thus formed, which could be taken to pieces and put together again at will and with the greatest ease; each part being colored in imitation of nature, and labelled with a number or the real name, by which it could be recognized at any time, either in or out of its natural position in the manikin. In 1830 this art, called clastic anatomy (Gr. κλαστός, broken), was brought to great perfection; and a comparatively faultless model of the human body, 5 feet 6 inches in height, could be manufactured and sold for $600. This was still, however, too expensive for many persons, and complete manikins of a smaller size (3 feet 6 inches, in lieu of 5 feet 6 inches) were manufactured, and sold for $200 each. Each manikin contains 129 distinct pieces, forming different layers and organs or parts of organs.

ANATOMY (Gr. ἀνατομή, dissection), the science which treats of the structure of organized bodies as learned from dissection. During the primitive ages of the world anatomy was little cultivated as a science, and hence the art of surgery was undeveloped. In later ages religious scruples forbade the opening of the human body to inspect the viscera; and students of anatomy were limited to the dissection of animals, to gain a knowledge of internal organs and their functions. The first branch of this science which was studied from nature was therefore animal anatomy, now called "comparative anatomy," from the fact of different types of the animal kingdom differing in their internal structure as much as in their external form. Aristotle was the first to give accurate descriptions of the internal organs of different species of animals, and for many centuries after him little was done to advance the science by actual dissection and observation. Hippocrates had some accurate views of osteology, but his descriptions of the brain and the heart, and their respective functions, show that he knew little of anatomy. The first important development of human anatomy, of which we have any authentic record, took place at Alexandria in Egypt during the reign of the Ptolemies. Erasistratus of Ceos and Herophilus of Chalcedon are mentioned by Galen as eminent anatomists of the Alexandrian school; and Herophilus is said to have obtained permission to open and inspect the bodies of living criminals, to gain a knowledge of internal organs and their modes of action. The writings of Celsus show that he cultivated anatomy, but the next great steps in advance were made by Claudius Galenus, the celebrated physician of Pergamus. Galen was born at Pergamus, A. D. 130. He collected the works of his predecessors and pursued the study of anatomy, as far as he was able, by dissecting animals. He first showed that arteries in the living animal contain blood, and not air alone, as had been supposed by Erasistratus; but it did not occur to him to notice the circulatory movement of the blood in the vessels. This was reserved for Harvey, many centuries later; before which time the blood was supposed to move, in the veins as well as in the arteries, from within outward. During the middle ages the natural sciences, neglected by the Christians, were mainly cultivated by the Arabs; but, as the Mohammedan religion forbade the dissection of human bodies, their physicians were obliged to rely on the knowledge transmitted to them by the school of Alexandria, and chiefly on the works of Galen. Their writings add little or nothing to the science of anatomy, unless it be the names of certain organs translated from the Greek into the Arabic, and afterward to some extent adopted by Italian and Spanish writers on anatomy. The spirit of religious liberty and commercial enterprise revived the cultivation of the arts and sciences in Italy during the 14th century; and Mondino da Luzzi, professor of anatomy at the university of Bologna, first publicly dissected two human bodies in the presence of medical students in 1306 and 1315, and shortly afterward published a description of the organs from direct observation and dissection. This, with the works of Galen, served as a text book for the schools till the 16th century, when the study of human anatomy from actual dissection became general in the medical schools of Italy. From this time forward human anatomy has been constantly studied from actual dissection and observation, in those countries of Europe where religious considerations offered least resistance to this mode of proceeding. First Italy, then Holland, Denmark, Sweden, Germany, France, England, and America, have furnished names of eminence in the cultivation and advancement of the science of anatomy; but popular prejudices have hindered the free dissection of human bodies in medical schools, until a very recent date, in many states of Europe, and also in this country. Anatomy is now one of the most important branches of natural science, and its various departments have become so extensive as to require separate divisions and distinct methods of analysis. We have thus comparative anatomy, including every type of animal organization, not excepting man, as one of the types of the animal kingdom; and human anatomy as a distinct branch of study, in connection with physiology, pathology, surgery, and therapeutics. These again are subdivided into distinct branches, under the names of regional or surgical anatomy, descriptive or special anatomy, histological or general anatomy, and microscopical or minute anatomy.—Surgical anatomy treats of the relations of organs to each other, in each region of the body, such as the positions, forms, dimensions, structure, and peculiarities of nerves and vessels, muscles, glands, and membranes, in the head, the trunk, and the limbs, a proper knowledge of which is necessary to guide the surgeon in his delicate and difficult operations. He must know where to cut and what to avoid in operating on the living body; for the life of the patient might be jeoparded if the surgeon were not well acquainted with the relative anatomy of vital organs. Descriptive anatomy treats of the distinct systems which pervade the whole frame, or perform a certain class of functions in the organism; such as the bones of the skeleton, the muscles, the skin, and the nerves of the whole body; the digestive system; the blood vessels; the respiratory organs; the generative and the urinary apparatus; the blood and the secretions. General anatomy treats of the different tissues which compose the special organs or classes of organs in different parts of the body; such as the three distinct coats of the stomach, *i. e.*, the mucous membrane, the muscular coat, and the serous membrane or peritoneal covering; the areolar or connective tissue, found between the mucous and muscular layers, and disseminated more or less extensively throughout the body. Minute anatomy investigates the elementary basis of organic nature, and by the aid of chemistry and the microscope observes and analyzes the atomic and cell structure of the tissues which compose the organs of the body; the fluids and contents are also subjected to this minute analysis. Animal anatomy was scantily and almost exclusively studied by the ancients; human anatomy was fairly commenced by the Italian schools of the 14th, 15th, and 16th centuries; the descriptive branch was chiefly cultivated throughout Europe until the end of the 18th, when Bichat instituted and almost originated the systematic study of general anatomy. Microscopic observations had been made by Malpighi and other anatomists, but many of the great discoveries of comparative and general anatomy have been made in the present age; and the systematic study and development of minute anatomy date from the improved construction of the compound microscope in 1832, before which time it was impossible to make much progress in this most important branch of science. Descriptive or special anatomy is limited to the study of the parts which form the body of one type or individual, or of the two sexes of one species, as man and woman. It does not, however, exclude reference to age and difference of race. —The organs of the body have been classed in various ways by different anatomists, and mostly according to the nature of their special structure and peculiarity of use or function. Bichat's method, slightly modified, is most in use, and is perhaps the best. By this the organs are classed as follows: I. Organs pertaining to the animal, voluntary, or relational functions. II. Organs pertaining to the nutritive functions. III. Organs pertaining to generation, or the reproductive functions. To the first class belong the organs of locomotion, innervation, voice, and sensation. 1st. The skeleton, composed of bones, cartilages, ligaments, and joints, as instruments of locomotion and forming the subject of what is termed osteology. 2d. The muscular system, composed of muscles, tendons, sheaths, and their appendages, as agents of locomotion, forming the subject of myology. 3d. The nervous system, composed of medullary white substance and gray vesicular matter, enclosed in sheaths of serous and fibrous membrane, forming the brain, spinal cord, ganglia, and nerves. The special study of the structure and functions of the nervous system and appendages is termed neurology. 4th. The vocal organs, as an apparatus of relational use between man and the external world, are the larynx or throat, and the mouth; the one as an organ of the voice, and the other as an organ of articulation or speech. 5th. The special organs of sense are distinguished into proper and common; taste, smell, sight, and hearing belong to the former, and touch, the sense of temperature, and the muscular sense of resistance, weight, lassitude, &c., belong to the latter. The mouth, the nose, the eyes, and the ears are special organs, but the whole external surface of the body serves for the sense of touch and temperature, while the whole internal muscular structure seems to be affected by the sense of lassitude, and the muscular parts of the trunk and limbs are affected by the sense of resistance to external weight or force.—To the second class of organs, pertaining to the functions of nutrition, belong the organs of digestion, respiration, circulation, secretion, and excretion. 1st. The digestive system consists of the alimentary canal, together with its accessory organs, such as the salivary glands, the liver, and the pancreas. The alimentary canal, consisting of its successive portions, namely, the mouth, œsophagus, stomach, small intestine, and large intestine, receives the food and accomplishes its digestion by the mechanical operation of the teeth in mastication, followed by the modifying action of the various digestive secretions. 2d. The heart is the centre of the circulatory system, which consists of two distinct circuits, called pulmonary and systemic. From the right ventricle of the heart the dark impure blood is sent through the pulmonary arteries into the lungs, where the minute capillary blood vessels are exposed to the almost direct contact of the air, from which oxygen is absorbed to vivify the blood, giving it a bright scarlet red. A thin membrane intervenes between the air in the lungs and the blood, but this does not impede the absorption of oxygen and the exhalation of carbonic acid gas, the one to give new life and the other to rid the blood of poisonous gas and effete matter. When thus purified and renovated in the lungs, the blood returns to the left side of the heart, performing a complete circuit in the region of the heart and lungs alone, for this sole purpose. It is then propelled from the left ventricle of the heart, through the aorta and all the arteries of the whole body, into every organ, for the purpose of nutrition. The capillary vessels ramify minutely in every organ, and the tissues of the part absorb the nutrient portions of the fluid, and return waste matter to the veins, in exchange for the nutriment brought to them by the arteries. The general system of arteries carries pure blood to all parts of the body, and the general system of veins returns impure blood from all parts of the body back into the heart, to be thence sent into the lungs for purification, and thus keep up perpetual circulation and renovation. 3d. The respiratory organs are the larynx, the trachea or windpipe, the bronchial tubes, and air vesicles within the lungs. Their function is to breathe in new supplies of air to vivify the blood, and to exhale carbonic acid and other vitiated matters, which are poisonous when accumulated in too large a quantity. 4th. The kidneys separate from the blood the elements of the urine, and thus rid the system of another kind of waste matter, which also becomes poisonous if allowed to accumulate within the vessels that contain and circulate the vital fluid. When in the bladder the urine is not dangerous, because no longer mingled with the blood, unless too much accumulated and too long retained.—To the third class of organs belong the reproductive systems, male and female. These are not essential to the life of the individual, as they may be extirpated without danger even to the health.—General anatomy treats of the different sorts of tissue composing the organs of the body. Bichat made 21 distinctions of animal texture, but later anatomists have modified his method of distinction. It will suffice here to say that the sheath or covering membranes of bones, muscles, nerves, and many other organs, are formed of a fibrous kind of membrane, much alike in texture and in its leading properties, whether it be the periosteum of the bones, the fibrous sheath of the muscles, the neurilemma of the nerves, or the *tunica albuginea* or covering of the testicles, the ovaries, &c. Serous membrane is also the same kind of tissue in every part of the body, although called arachnoid when it serves as a covering for the brain, pleura as a covering for the lungs, and peritoneum as a covering for the viscera of the abdomen, and a lining for the inner walls of the trunk below the chest. The leading elements of structure in the organs of the body are fibrous tissue, serous membrane, bony texture, cartilaginous texture, fibro-cartilage, muscular fibre of various kinds, striated and non-striated, glandular tissue, mucous membrane, dermoid tissue or skin, cuticle or epidermic tissue on the surface of skin and mucous membrane, horny tissue, as the hair and nails, white nervous or medullary substance, and gray nervous or ganglionic or vesicular matter; and diseases are characterized in many instances, not so much by the particular organ affected in any part of the body, as by the particular tissue affected by disease in any given region.—Minute anatomy goes deeper still into details, and with the microscope and chemical analysis endeavors to find out the elementary constitution of the tissues and fluids of the body. Thus chemistry reveals to us that the simple elements found in the tissues are oxygen, carbon, hydrogen, nitrogen, sulphur, phosphorus, magnesium, calcium, sodium, potassium, chlorine, fluorine, silicon, iron, and manganese, with perhaps a trace of two or three others. The compound elements are of three classes: first, substances of an organic nature introduced with the food, or formed in the processes of digestion and nutrition; secondly, substances resulting from the waste or disintegration of the body; and thirdly, substances of inorganic or mineral origin. The inorganic compound substances are water, chloride of sodium, chloride of potassium, fluoride of calcium, hydrochlorate of ammonia, carbonate of lime, bicarbonate of lime, carbonate of magnesia, carbonate of potassa, bicarbonate of potassa, carbonate of soda, bicarbonate of soda, sulphate of potassa, sulphate of soda, sulphate of lime, basic phosphate of lime or bone earth, acid phosphate of lime, phosphate of magnesia, phosphate of potassa, neutral phosphate of soda, acid phosphate of soda, ammonia, and phosphate of magnesia and ammonia. The compound substances resulting from waste of the human body are principally carbonic acid, urea, creatine, creatinine, urate of soda, and urate of potassa. The substances of an organic nature related to the nutrition of the body are the uncrystallizable albuminoid matters, such as albumen, albuminose, fibrine, pancreatine, mucosine, musculine, globuline, hematine, biliverdine, and melanine; crystallizable substances, either containing nitrogen, such as glycocholate and taurocholate of soda, or destitute of nitrogen, such as sugar and fat. By microscopic observation, the elementary structure of the tissues is found to consist mostly of minute cells, fibres, tubes, and a homogeneous or granular substratum. Schwann believed that all the tissues of the body were formed from cells; but subsequent observation shows that although many tissues retain their original cellular structure throughout life, and many more are formed from cells which are afterward metamorphosed, there are some in which no other cell agency is employed than that which occurs in the elaboration of the plastic material; a certain structureless lamella, commonly called basement membrane, offers no visible traces of cell structure, but rather resembles the filmy tissue of which the walls of minute cells themselves are formed. It is, however, generally believed that minute cells, or other analogous or derived forms, constitute the elementary organic parts of nearly every tissue, and that all chemical changes occur in them, as integral elements of structure, without altering their numbers and relative positions; that these minute anatomical elements, in fact, are as permanent in form as the tissues and the organs they compose; and that all growth in the individual organism takes place by a relative enlargement of their size, and not by any increase of their number; so that, as the organs remain the same in form and number in the adult as in the new-born child, the same is true of the tissues that compose the organs, and the microscopic cells composing tissues. The principal varieties of cells now recognized are: the red globules of the blood, flattened, circular bodies, homogeneous in structure, from $\frac{1}{4000}$ to $\frac{1}{3000}$ of an inch in diameter; the white globules of the blood, which are colorless and granular, spherical in form, and $\frac{1}{2500}$ of an inch in diameter; scale-like epithelial and epidermic cells, very thin, pentagonal or hexagonal in shape, with a round or oval nucleus imbedded in their substance; columnar and ciliated epithelium cells, lining certain parts of the alimentary canal, air passages, generative organs, and ventricles of the brain; glandular epithelium cells, forming the active agents of secretion in the glandular organs; and the nerve cells of the brain, spinal cord, and ganglia. The fibres are: the white fibres of areolar tissue, of tendons, fasciæ, and the like; the yellow elastic fibres of elastic tissue; the compound muscular fibres; and ultimate nervous filaments. The tubular elements are the capillary blood vessels and lymphatics, and the straight or convoluted tubules of the kidneys, the testicles, and some of the glandular organs. The homogeneous or granular substratum, in which these anatomical elements are imbedded, varies in consistency and composition in the different tissues.

ANATOMY, Comparative. See COMPARATIVE ANATOMY.

ANAXAGORAS, a Grecian philosopher, born at Clazomenæ in Ionia, about 500 B. C., died in 428. He rejected wealth and honors that he might indulge his love of meditation and philosophy. From Clazomenæ he removed to Athens, where he lived in the closest intimacy with Pericles, and also numbered among his friends or pupils several of the most distinguished Athenians of that period. Anaxagoras is generally considered the first of the Greeks who conceived of God as a Divine Mind (by him termed *νοῦς*) acting upon matter with conscious intelligence and design. He taught that the sun was no deity, but an inanimate fiery mass, and therefore not a proper object of worship; and that the miraculous appearances at sacrifices were explicable by natural laws. He suggested that the moon shone by reflected light, and rightly explained solar and lunar eclipses. His attempt to account for these phenomena, at that time regarded as supernatural, on natural principles, brought him into great danger. He gave moral expositions of the myths of Homer, and explained the names of the gods by allegory. As a penalty for what was accounted his impiety, he was condemned to die; but through the influence of Pericles his sentence was commuted to banishment. He retired to Lampsacus, on the Hellespont, and died there a few years later in poverty. A little before his death the senate of Lampsacus sent messengers to inquire what commemoration would be most acceptable to him; he answered, "Let all the boys have a play day on the anniversary of my death!" This festival was called Anaxagoreia, and was observed for centuries. The fragments of his works have been collected by Schaubach (Leipsic, 1827), and by Schorn (Bonn, 1829).

ANAXARCHUS, a Grecian philosopher, a native of Abdera in Thrace, who attended Alexander the Great into Asia, and succeeded in winning his friendship by his wit and servility. After the death of Alexander, in 323 B. C., Anaxarchus, while returning to Greece, is said to have been shipwrecked on the coast of Cyprus, and pounded to death in a mortar by order of Nicocreon, one of the princes of that island, whom he had offended.

ANAXIMANDER, a Grecian philosopher of the Ionian school, born at Miletus in 610, died about 547 B. C. He is said to have led a colony to Apollonia in Illyria, and many wonderful deeds and inventions are ascribed to him. Grecian philosophy is indebted to him for the word *ἀρχή*, signifying origin or principle. His general doctrine, as stated by ancient writers, concerning the origin of nature, was that the first principle of all things is infinity (*τὸ ἄπειρον*); that the universe, though variable in its parts, as a whole is fixed and unchangeable; that infinity is the beginning and end of all things. He was the first to commit philosophical doctrines to writing. He wrote a treatise on geometry, and made calculations on the distances and size of the heavenly bodies. He held that the stars are globes of air and fire animated by divinity, that the earth is a globe fixed in the centre of the universe, and that the sun is 28 times as large as the earth. He was the first to compose a treatise on geography, and also prepared a chart of such portions of land and sea as he was acquainted with. According to some, he invented the sun dial.

ANAXIMENES. I. A Grecian philosopher, born at Miletus, flourished in the latter half of the 6th century B. C. He taught that the essence of all things is air, whence all things are produced by condensation and rarefaction through eternally existing motion; that the sun and moon are fiery bodies of a flat, circular form; that the stars are also fiery substances, fastened like nails in a crystalline sphere; and that the earth is a tablet resting on air. **II.** A native of Lampsacus, a historian and rhetorician, and one of the preceptors of Alexander the Great. He wrote a history of

Alexander's reign, and that of his father Philip, and also a history of Greece.

ANCACH, a N. W. department of Peru, between the Andes and the Pacific, bounded N. E. by the Marañon; area, about 18,000 sq. m.; pop. 317,000. It is one of the most fertile portions of Peru, producing heavy crops of cereals and a large quantity of sugar, and in some parts cotton. The elevated table lands are made very fertile by irrigation. Excellent marble is quarried and valuable minerals abound. The capital is Huaras, in an extensive, beautiful, and populous valley of the same name. Wood here is scarce, and its place is supplied with *champa*, a black vegetable matter resembling lignite. The other chief cities are Huaylas, Santa, Huari, Cajatambo, Pomabamba, and Pallasca, each the capital of a province or district of the same name. It was through the passes of this department that the Colombian army, in the war of independence, made its astonishing march into Peru to attack the Spanish forces at Junin.

ANCELOT. I. Jacques Arsène François Polycarpe, a French dramatist, born in Havre, Feb. 9, 1794, died in Paris, Sept. 7, 1854. He held an office in the ministry of the marine, which he lost after the revolution of 1830, as well as a pension granted him by Louis XVIII. In 1841 he was received a member of the French academy. His first tragedy, *Louis IX.* (1819), had great success from its adoption by the royalists as an offset against Casimir Delavigne's *Vêpres siciliennes*. After retiring from office he devoted himself chiefly to the rapid production of vaudevilles and light pieces for the minor theatres. He also published *Six mois en Russie*, in prose and verse (1826); *Marie de Brabant*, a poem in six cantos; and *L'Homme du monde*, a melodramatic romance, afterward dramatized. **II. Marguerite Louise Virginie Chardon**, a dramatist and novelist, wife of the preceding, born in Dijon, March 15, 1792, died March 21, 1875. She collaborated largely in her husband's lighter works, and produced several successful comedies, the most popular of which was *Marie, ou trois époques* (1836). Her *Théâtre complet* (4 vols., 1848) comprises 20 plays. Her most popular novels have passed through many editions. She also cultivated painting, and in 1828 exhibited *Une lecture de M. Ancelot*, a picture which excited much attention from its portraits of nearly all the Parisian *littérateurs*.

ANCHISES, a legendary Trojan prince, the father of Æneas. He was related to the family of Priam, and was king of Dardanus in Troas. Venus was enamored of him, and, visiting him in the disguise of a Phrygian princess, became the mother of Æneas. According to Virgil, Anchises survived the capture of Troy, being borne from the burning city on the shoulders of his son, and died in Sicily shortly after the arrival of Æneas in that island. The people of Egesta, a town situated near the place where he is said to have been buried, erected a sanctuary and celebrated funeral games in his honor.

ANCHOR (Gr. *ἄγκυρα*, Lat. *anchora*, Ger. *Anker*), a metal hook of suitable form and of sufficient weight and strength to enable a ship, by means of a chain or cable attachment, to lay hold of the bottom, and thus remain fixed in any desired position. The form of the anchor has undergone but slight modification since the time of Anacharsis, the Scythian philosopher, about 594 B. C. Before him anchors with one arm or tooth had been a short time in use, but he first added the second. The later Greek anchors were of iron, but originally they consisted of large wooden pipes filled with melted lead. In the heroic times of Greece, large stones were sunk into the water by ropes to hold the ship; and a little later bags of sand and baskets filled with rocks were used. Every ship was supplied with from four to eight anchors. The largest of them was termed the *sacra*, and was only used in times of great danger; hence the proverb, *sacram anchoram solvere*, to fly to the last refuge. The Chinese anchors, now as in ancient times, are only crooked pieces of heavy wood.—With the exception of Spain and certain of the South sea islands, where copper is occasionally employed, the metal used in the construction of anchors is the best of wrought iron. The form of the common wrought-iron anchor, with the manner in which it "lays hold" of the sea bottom, may be best understood by a reference to fig. 1. It is evident from the direction of the strain that any forward movement will cause the lower fluke and arm to be buried still deeper in the earth. Anchors are called solid or ordinary when the shank and arms are wrought into a body; they are called portable when they can be taken to pieces. Each part of an anchor has a distinct name. The shank or the central part of the instrument is a round or octagonal bar of iron tapering toward one end, where it becomes square; the arms are two curved pieces projecting from the heavy end of the shank at right angles with it, and in opposite directions; the stock is a transverse beam, of wood or of iron, fastened to the square end of the shank at right angles with it and with the arms, and serves to cant the anchor when the arms fall on the bottom in

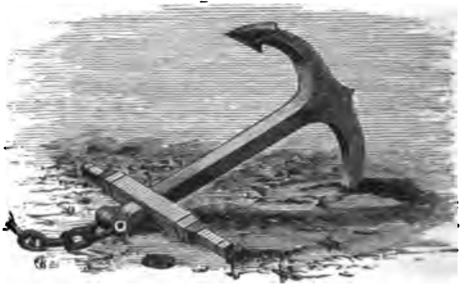


Fig. 1.—Common Anchor.

a horizontal instead of a vertical position; the square is the square end of the shank, which at the extreme end, just beyond the place where the stock is fastened, is bored through for attaching the shackle by means of a pin; the shackle is a ring, by means of which the cable or chain is attached to the anchor; the crown is the extreme end of the shank, or the external part of the arms, on which the anchor falls when let go in a vertical position; the palms or flukes are parts of the arms, of a shield-like form, which are near their extremities, and constitute the holding surface of the anchor. The angle of the face of the palm with the shank is 51°. The arms extend from the shank in a curve the outside radius of which is 85. That part of each arm which sustains the palm is called the blade, and the part which projects beyond the palm, and has to open the ground, is named the point, peak, or bill. If 100 be taken as the unit of length for both the stock and shank, then 40 will represent the average length of each arm from the crown to the bill. The relative weights of these several parts may be roughly estimated as follows: The shank, $\frac{5}{10}$ of the whole; each arm, $\frac{2}{10}$; two palms, $\frac{1}{10}$; stock, $\frac{1}{5}$; shackle, $\frac{1}{15}$. When an anchor is let go from the ship, it falls vertically through the water, and, should the bottom be an even one, the crown will strike first; but a rocky bed may compel one of the arms to receive the full force of the fall, for which reason any cross section of an arm should represent an ellipse, with the line of its greatest diameter vertical to the point of probable contact, thus receiving the heaviest strain in the direction of the greatest strength. After striking the ground the anchor falls sideways, the arms lie flat, and the stock rests on one end. A length of chain proportional to the depth of water, and so calculated that the hardest pull of the vessel will not lift it entirely from the ground, is permitted to run out. The action of the current or of the wind on the vessel soon makes her exert a traction on the chain, and this lying on the ground pulls down the shackle, bringing the stock flat on the bottom, and the arms perpendicular to it; this is called canting the anchor. The longer the stock and the shorter the arms, the less force will be required to perform this operation; hence in all anchors the stock is longer than the arms. After canting, the anchor will be dragged or will hold. Quick holding depends on the sharpness of the bill and the angle of the palm with the ground. For "weighing anchor," the chain or cable is taken in by aid of a capstan, till the bow of the vessel is brought over the shackle; here an increased pull is necessary to trip it, and the anchor is raised to its place. The property of quick tripping depends on the curve of the arm, and on the angle of the palm; they have to be such that when the shackle is pulled up vertically, the bill cuts open a short curved circular way in which the palm and arm follow. When the palm is out, the ground is torn open by the arm, which is comparatively sharp, and acts with a more advantageous leverage than the palm would. More than two thirds of the ruptures of anchors happen in the operation of weighing. We have said that the arms ought to be thicker in the dimension parallel to the shank, to resist shocks against rocks. The same is necessary to resist the strain in tripping. The shank is exactly in the same circumstances, and has to be thicker in the direction of the arms, and to decrease in size from the crown to the square. Though theory indicates rectangular sections as best for the arms and shank, they are in practice made round or oval, or at least the angles are much rounded. This has been found necessary for the preservation of cables, which often take a turn around the anchor when the vessel changes its direction with the tide or wind.—The forging of an anchor requires the constant superintendence of an educated engineer, while the workmen should be chosen with an eye to their skill and judgment, as well as muscular strength. A sufficient number of wrought-iron bars made from the best scrap iron, or from "Welsh mine iron," are bound together by iron hoops, forming the faggot; this is placed in a specially contrived furnace, where it is brought to a white or welding heat, when it is removed by the aid of a crane to the anvil, and subjected to the rapid and powerful blows of the stamping hammer. When an approximate form is thus obtained, the finishing is done by heavy sledges in the hands of the anchor smiths. The arms and stock may be forged separately and then welded together at the crown, or, as in the process patented by Mr. Perrins of England, the whole may be built up by the welding together in a given order of a number of separate pieces, so adjusted as to secure the greatest strength in the direction of the heaviest strain. When the stock is of wood, it consists of two beams, generally oak, mortised in the centre so that they may embrace the square, upon which they are firmly bolted; the middle thickness should be one twelfth of the length, and the whole should taper from the centre out, the diameter of the end being about one half that at the centre. The iron stock, which is rapidly replacing that of wood, is a simple round bar tipped with knobs, which prevent its entering the ground, and with one end bent at right angles. This passes through a hole in the square which is rounded out for the purpose, and is held in position by a metal ring or shoulder upon one side, and a slit and key on the other; by removing this key, the whole stock may be driven through, and thus, owing to the crook upon the end, be doubled down upon the shank, rendering it much more compact and portable.—So important is the quality of strength in an anchor, that all modifications of the tried and approved form, or any improvements that have the appearance of sacrificing strength to convenience in handling,

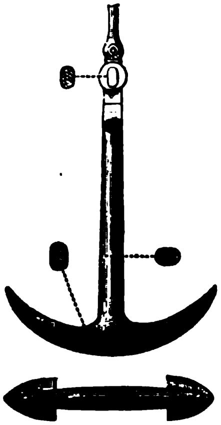


Fig. 2.—Admiralty Anchor.

or even gain in holding power, seem to have been regarded with suspicion. Hence the anchor now in general use might almost have been described a century ago. In 1833 Lieut. Rodger of the English navy received letters patent for an improvement in the size and form of the palms, "having found by experience that anchors with small palms will not only hold better than with large ones, but that the arms of the anchor, even without palms, have been found to take more secure hold of the ground than anchors of the old construction of similar weight and length." He fixed upon one fifth of the length of the arm as a suitable proportion for the length or the depth of the palm. The palm of the anchor, instead of being flat, presents two inclined planes, calculated for cutting the sand or mud instead of resisting perpendicularly. The Lenox, Mitcheson, and Aylen anchors are all improvements on the old admiralty pattern; while the Isaac anchor, an American invention, has a flat bar of iron passing from palm to palm, in addition to which two other bars unite the ends of the stock to the centre of the shank, intended to prevent the fouling of the cable. A novel and in many respects important improvement is that of the Porter anchor, having movable flukes or arms; this anchor, with certain valuable alterations, is represented above as the "Trotman anchor." It will be readily seen that, by the closing of the upper arm against the shank, the chances of fouling are greatly decreased, as also the danger of the ship's grounding upon her anchor in shallow water. The accompanying table, showing the relative order in which the several anchors above mentioned stand with regard to each of the properties essential to a good anchor, was embodied in a report made by a committee of five ship owners appointed by the lords of the admiralty to test their relative merits. The names are arranged alphabetically:

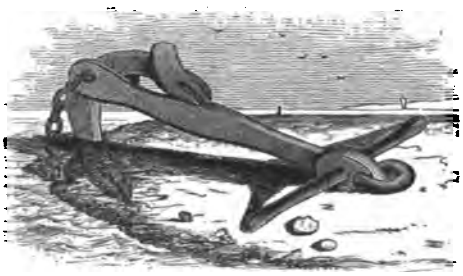


Fig. 3.—Trotman Anchor.

ANCHOR.	Strength computed from first crack.	Holding long and short scope.	Facility of storing.	Quick holding.	Quick tripping.	Exemption from fouling.	Facility of sweeping.	Facility of transport in boats.	Fishing in a heavy sea way.	Canting.
Admiralty .	4	5	1	2	1	4	1	2	2	2
Aylen	7	4	1	2	3	4	1	2	2	5
Porter, or Honiball	2	2	3	4	2	1	4	3	5	3
Isaac.......	1	6	4	5	1	1	4	4	5	1
Lenox.....	6	3	2	1	2	3	2	1	3	2
Mitcheson .	Trial refused.	1	3	1	3	2	3	2	4	4
Rodger.....	5	2	1	1	2	4	2	1	1	2
Trotman....	3	1	3	3	4	1	4	3	5	5

The estimated numerical values of these several anchors are as follows: Trotman, 1·28; Rodger, 1·26; Mitcheson, 1·20; Lenox, 1·13; Porter, 1·09; Aylen, 1·09; Admiralty, 1, standard; Isaac, 0·73. Notwithstanding the above favorable report, the Trotman anchor has not been received with general favor by ship masters, though largely used by the merchant steamers.—In general service, anchors rank according to their size and weight, as follows: bower, sheet or stream, and kedge; and a competent authority recommends them in the following order: the Lenox and Rodger for bower, Mitcheson for sheet, and Trotman for a shore anchor.—The anchor adopted by the United States navy is solid with an iron stock, and as a rule its weight is proportionally less than the English standard, our officers preferring a smaller anchor with greater length of chain. The following table gives the relative size of chains to anchors of given weight, and is compiled from the navy regulations on this subject:

Weight of anchor.	Size of chain.
8,000 lbs.	2$\frac{1}{16}$ inches.
6,000 "	1$\frac{3}{4}$ "
4,000 "	1$\frac{9}{16}$ "
2,000 "	1$\frac{3}{16}$ "
1,000 "	$\frac{13}{16}$ "

The following is a reduced table of "Lloyd's Regulations for the Number and Weights of Anchors for Merchant Vessels":

Ship's Tonnage.	Bower.	Stream.	Kedge.	Bower, Wood Stock.	Bower, Iron Stock.	Stream.	Kedge.	Second Kedge.
Tons.				Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
50	2	1	1	3	4	1¼		
100	2	1	1	5	7	2¼	1¼	
250	3	1	1	13	15	5	2¼	
500	3	1	2	23	26	9	4¼	
1,000	3	1	2	35	41	12	6¼	3¼
1,600	3	1	2	43	50	14	8¼	4
2,000	4	1	2	47	54	14	9	4¼

In addition to these various forms of common anchors, there are numerous devices designed for special service. Among these are the grapnel and mushroom anchors shown in fig. 4. The former is adapted for securing light craft, and the latter—a solid concave metal plate with central shank—is only used where permanent anchorage is desired, as for light-ships, buoys, &c. The latest novelty is an anchor with an elastic shank. The principle of having a spring between the soil and the vessel is evidently excellent, as it is certain that without the natural spring formed by the curve in the chain it could never withstand the sudden jerks from a mass of several hundred tons, though the better place for the spring seems to be on board rather than in immediate contact with the rough sea bottom.

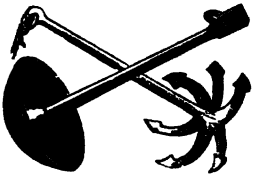
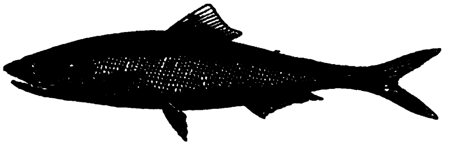


FIG. 4.—Grapnel and Mushroom Anchors.

ANCHORET, Anchorite, or more properly **Anachoret** (Gr. ἀναχωρητής), a person retired from society, especially one who has withdrawn himself with the specific purpose of attaining a higher degree of spirituality. The term is particularly applied to the hermits who began to appear in the Christian church about the 3d century, living in solitude generally in desert places, and not, like the later cenobites or monks, in communities. They often subjected themselves to extreme penances and mortifications. St. Paul the Hermit, St. Simeon Stylites, and St. Anthony of the Desert were among the most celebrated of them, Paul being reckoned the earliest of the solitaries. After the institution of monasticism they gradually disappeared in the West. A synod in 692 ordained that no person should be admitted an anchoret until he had resided three years in a monastery. Hermits are still to be found in the East, unconnected with any convent. Some writers consider Enoch, Elijah, John the Baptist, and Jesus to have been anchorets. The Therapeutæ of Egypt, who were probably derived from the Jewish Essenes, were anchorets, or at least ascetics. The same is true to a degree of the Nazarites of the Old Testament. But so far as Christian anchorets are concerned, they must be referred to the time of the Decian persecution, as the era when they first attained to any historic consideration.

ANCHOVY, a small fish of the genus *engraulis* of Cuvier, the peculiar features of which are the opening of the mouth extending behind the eyes, and the long sharp head and projecting upper jaw. It is distinguished from the sprat and other similar fishes by its very short anal fin, and the dorsal fin being immediately above the ventral. Anchovies enter the Mediterranean from the sea in enormous shoals in the spring, and deposit their ova along the shores in May, June, and July. They are caught like the herring with nets at night, with the use of lights. Gorgona, a small island west of Leghorn, is a famous place for the fisheries, and it gives its name to the best qualities of the commercial article. Other important fisheries are along the coasts of Provence and Catalonia. As the fish are taken, the bodies, separated from the heads and entrails, are salted and packed in small barrels, and in this state are ready for exportation. Sent to other countries, they are there repacked in bottles. The brine in which they are kept is reddened with ochre and Venetian red, which is supposed to be done for the purpose of concealing the other dirt. Notwithstanding their impurities and the substitution of many inferior fish, anchovies are a favorite relish at the breakfast table with many, being taken out of the bottles and eaten raw. Anchovy sauce has been a favorite condiment from the time of the Romans. They called it *garum*, and prepared it as it is now made, which is by bruising and boiling the fish over a slow fire with melted butter.



Anchovy (Engraulis encrasicholus).

ANCHYLOSIS (Gr. ἀγκύλωσις, a bending), that condition of a joint in which its natural mobility is greatly impaired or entirely lost. The derivation of the word would imply that the joint is bent, but it is used to designate the abnormal condition in any position. Anchylosis may be true or false. In the former the material which has been produced by the diseased process, and which prevents the proper degree of motion, is bone; in the latter it is fibrous tissue, or the muscles which surround the joint are shortened to such an extent as to curtail movement. In either case the material may be between those surfaces of the bones which help to form the joint (intra-articular), or may lie chiefly or entirely outside (extra-articular). Anchylosis is usually the result of an inflammation in or near the joints affected, though it may occur in cases where the joint has been retained in a fixed position for a considerable length of time, the disease or injury being in a distant part. If a bone be broken, it must be kept fixed in order that it may unite; and to effect this it is usually necessary to render the joint above and that below the fractured part immovable until union has taken place. During this period, if proper precaution be not exercised, the joint may become stiffened, and in this case it is almost always by false anchylosis. This result is more apt to occur if the fracture be very near to, or especially if it implicate, the articulation. When a joint is inflamed, the immobility necessary to cure this condition, and still more the not infrequent partial or complete destruction of those structures which form it, are frequent causes of anchylosis. This result, though never desirable, is at times unavoidable, and the most favorable termination that can be expected.--The treatment is of three kinds, preventive, precautionary, and remedial. Anchylosis may be prevented by moving the joint at proper times, the parts which surround it being in this way kept from contracting. As regards precautionary treatment, where anchylosis is inevitable, the surgeon should always endeavor to place the part in such a position as that it shall be most useful to the patient; *e. g.*, a nearly straight position for the knee, a bent position for the elbow. To remedy the resulting deformity or inconvenience, the contracted parts may be stretched gradually by proper apparatus, or they may be stretched and ruptured suddenly; and some which refuse thus to yield may in appropriate cases be divided by a narrow-bladed knife passed subcutaneously. The above treatment can be practised only where the anchylosis is of the false kind; if it be true, a portion of the bone at or near the joint may be removed, and the parts be allowed to stiffen in a more convenient position, or an attempt may be made to form a new joint by keeping up motion. Where the limb is useless and inconvenient, it may be advisable to remove it.

ANCIENNE LORETTE, a village of Canada, 7 m. W. S. W. of Quebec; pop. in 1871, 2,833. It is a place of historical interest, as the refuge of a portion of the Huron Indians after they were defeated and driven from the E. shore of Lake Huron, about 1650. There are now about 250 of them, chiefly employed in making moccasins and snow shoes.

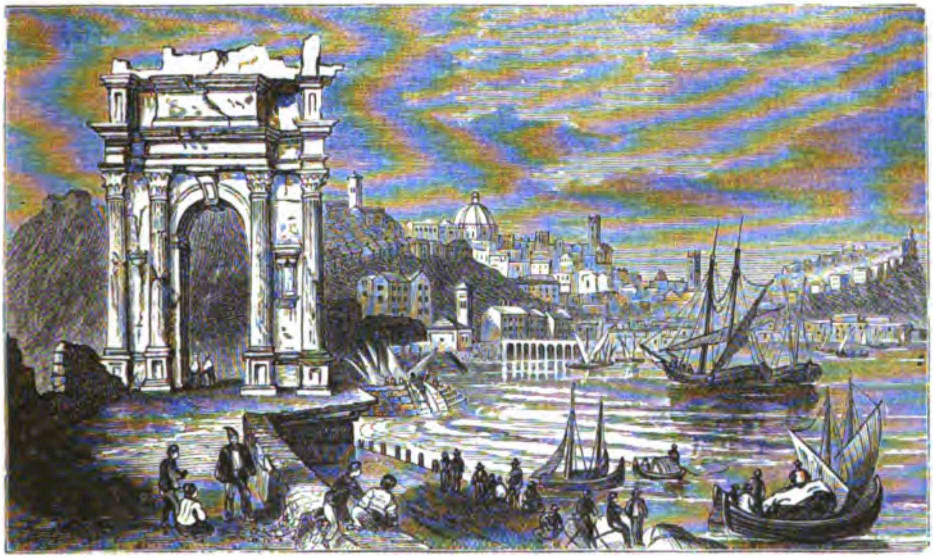
ANCILLON. I. David, a French Protestant divine, born in Metz, March 18, 1617, died in Berlin, Sept. 3, 1692. He was the son of a lawyer, and received his first education at a college of Jesuits, who endeavored in vain to convert him to Catholicism. After completing his studies at Geneva, he was pastor at Charenton, and afterward at Meaux (1641-'53) and at Metz (1653-'85). On the revocation of the edict of Nantes he went to Frankfort-on-the-Main, and was afterward pastor in that city, at Hanau, and in Berlin. He wrote *Apologie de Luther, de Zwingle, de Calvin et de Bèze* (Hanau, 1666), and several other small works. **II. Charles,** a French author, son of the preceding, born in Metz, July 28, 1659, died in Berlin, July 5, 1715. He graduated as a lawyer in Paris, failed to obtain from Louis XIV. the exemption of the Metz Protestants from the revocation of the edict of Nantes, though the persecutions were somewhat relaxed, and subsequently joined his father in Berlin, where the elector of Brandenburg placed him at the head of the French refugees, and subsequently sent him as minister to Switzerland. After being employed (1695-'99) by the landgrave of Baden-Durlach, the king of Prussia appointed him historiographer and chief of police. Among his works are *Histoire de l'établissement des Français réfugiés dans les États de Brandebourg* (Berlin, 1690), and *Histoire de la vie de Soliman II.* (Rotterdam, 1706). **III. Ludwig Friedrich,** grandson of the preceding, born in Berlin in 1740, died June 13, 1814. He was pastor of the French community in Berlin, counsellor of the upper consistory, and author of various writings. **IV. Johann Peter Friedrich,** a Prussian statesman and historian, son of the preceding, born in Berlin, April 30, 1767, died there, April 19, 1837. After graduating at the university of Geneva, he was appointed pastor of the French church in Berlin (1790), and professor of history in the military academy (1792). In 1793 he travelled through Switzerland and France. In 1801 he published *Mélanges de littérature et de philosophie.* Two years later followed his most important historical work, the *Tableau des révolutions du système politique de l'Europe depuis le 15^{me} siècle* (afterward translated by himself into German). This was followed by his works *Ueber Staatswissenschaft* (1819), *Ueber Glauben und Wissen in der Philosophie* (1824), and other writings.

ANCKARSTROEM, or **Ankarström, Johan Jakob,** the assassin of Gustavus III. of Sweden, born about 1760, executed at Stockholm, April 29, 1792. The son of a superior officer, he became a page at the court of Gustavus, and subsequently ensign in the royal body guard; but in 1783 he withdrew from military service, and settled into country life. As a partisan of the old aristocratic party he vehemently opposed the measures of the king, who followed up his work, begun on his accession, of restricting the power of the senate and the nobility. He became implicated in the seditious movements of the island of Gothland, and was tried for treason in 1790, but acquitted for want of evidence. The same year he engaged in a conspiracy with General Pechlin, Count Horn, Count Ribbing, Baron Bjelke, Colonel Liljehorn, and other discontented nobles, to kill the king; and on casting lots who should execute the deed, the choice fell upon Anckarstroem. On the night of March 15, 1792, at a masked ball, he shot the king, inflicting a fatal wound. Anckarstroem was at once arrested, tried, convicted, and sentenced, first to be ignominiously flogged, and then to die on the scaffold. He met his fate with great firmness, exulting to the last in the righteousness of his course, and refusing to disclose the names of his accomplices.

ANCLAM. See ANKLAM.

ANCONA. I. One of the four provinces of the department of the Marches, Italy, bounded E. by the Adriatic and traversed by branches of the Apennines, with fertile valleys, and by the small rivers Misa, Esino, and Musone; area, about 740 sq. m.; pop. in 1872, 262,359. Almost the whole province is under cultivation. It is rich in cattle, cereals, hemp, tobacco, wine, oil, and fruit, and produces some silk. **II.** A fortified city and free port, capital of the above province, on the Adriatic, 132 m. N. E. of Rome;

pop. in 1872, 45,741, including about 5,000 Jews and a number of Greeks, Levantines, and Turks. The city is built in the form of an amphitheatre, on the slope of two hills rising from the shores of the Adriatic. It is connected by railways and steamers with all parts of Europe and the East. The annual arrivals of ships are over 1,500, besides steamers. The chief imports are colonial produce, metals, and coals. The principal exports are corn, hemp, bacon, sulphur, and cotton. The coasting trade is also very active. The chief manufactures are woollens, cotton, silk hats, and paper. The port is formed by two moles: one, built by Trajan, is 2,000 feet long, 100 feet wide, and 65 feet above water, and is spanned by the famous arch of Trajan, considered the finest in the world; the other has a triumphal arch constructed by Pope Benedict XIV. from the designs of Vanvitelli. The harbor, defended by several forts, had fallen into decay and was filling up; but it has recently been dredged and is now rapidly improving. Ancona, notwithstanding its fine quay and a beautiful situation, has the disagreeable appearance of a Levantine city, with dirty and narrow business streets, though with a number of good residences along the quay. The cathedral, situated on a promontory, has a remarkable porch, a cupola reputed to be the most ancient in Italy, and fine marble pillars. The churches of San Domenico and San Francesco contain pictures by Titian; and there are also notable pictures in the other churches, most of those in St. Agostino being by Lilio, known as Andrea di Ancona. The English residents worship in the Free Church of Scotland chapel.—The city is believed to have been founded by a colony of Syracusans in the time of Dionysius the Elder. Trajan used the port as a military station. After having been governed by Romans and Lombards, and devastated by Saracens on several occasions, particularly in the 10th century, Ancona remained for a considerable period independent until 1532, when Clement VII. annexed it to the Papal States. In 1832 the citadel was seized by the French as a demonstration against the Austrians, who had occupied the insurgent Marches; but the papal authorities continued to preside over the civil administration. The French occupation lasted till 1838. In 1849 the city surrendered to the Austrians, who evacuated it after the battle of Magenta, fought June 4, 1859. Gen. Lamoricière, commander of the Papal troops, after his defeat at Castelfidardo, surrendered here to the Italians, Sept. 29, 1860. Ancona became part of Victor Emanuel's possessions Dec. 17, 1860.



Ancona, with the Arch of Trajan.

ANCRE, Concino de' Concini, marshal and marquis d', a Florentine adventurer and prime minister of France, shot in Paris, April 24, 1617. He was the son of a notary, and went to France in 1600 in the suite of the bride of Henry IV., Maria de' Medici, one of whose attendants, Leonora Dori or Galigai, was his wife. With the aid of this woman, who was the daughter of Maria's nurse, he soon rose to high favor at court. He fomented the disagreements between the king and queen, and when the latter became regent on Henry's death he was recognized as the prime favorite of the palace. He bought the marquisate of Ancre, and, though he had never been a soldier, was created marshal of France. The resentment of the country at his sudden elevation and his insolence was aggravated by his raising an army of 7,000 men, whom he kept at his own disposal and his own expense. Appointed prime minister by the queen regent, he kept the young king Louis XIII. under a restraint that was little better than captivity; and that prince before he was 17 years old gave his assent to a conspiracy formed by his favorite, De Luynes (a man whose fortunes the marshal himself had made), to put the minister to death. The murder was committed before the Louvre by L'Hôpital-Vitry, a captain of the royal guards, Du Hallier, and Perray; and Louis, presenting himself afterward at the window, cried out, "Thanks to you, I am now king." Vitry was made marshal of France. The body of the murdered man, after a secret burial, was dug up by the mob, dragged to the Pont Neuf, gibbeted, and torn into a multitude of pieces, which were then sold to the infuriated people. His widow, who is said to have been the first instrument of Richelieu's fortunes, was accused of Judaism, corruption, and sorcery, and burned on the Place de Grève, July 8, 1617. She displayed great firmness, and declared that the only sorcery she had employed toward the queen was "the power of a strong mind over a weak one."

ANCUS MARCIUS, the fourth king of Rome, said to have been the grandson of Numa, and to have reigned from 640 to 616 B. C. He revived the religious ceremonies which his grandfather had established, but which had fallen into desuetude. He waged successful wars against the Latins, took many of their cities, and transported their inhabitants to Rome. He founded a colony at Ostia, erected a fortress on the Janiculum, and caused several other works to be constructed, which added to the strength and security of his capital.

ANCYRA (now *Angora*), an ancient city of Asia Minor, originally in Phrygia, said to have been built by Midas, and to have derived its name from an anchor found on the place where it stood. It was enlarged by Augustus, was made the capital of the province of Galatia, and became a principal depot of the Romans for the productions of the East. A copy on marble blocks, erected by the inhabitants of Ancyra, of the inscriptions of Augustus's Roman bronze tablets, which was discovered by Tournefort, and has since been often expounded by antiquaries, is known under the name of *Monumentum Ancyranum.*

ANDALUSIA (Span. *Andalucia*, originally *Vandalusia*, from the Vandals who settled there in the 5th century; in antiquity, *Bœtica*), the most southern grand division of Spain, lying between lat. 36° and 38° 40′ N., and lon. 1° 30′ and 7° 30′ W.; area, 27,153 sq. m.; pop. in 1867, 3,200,944. It is bounded N. by Estremadura and New Castile, E. by Murcia, W. by Portugal, S. W. by the Atlantic, and S. and S. E. by the straits of Gibraltar and the Mediterranean. Its chief river is the Guadalquivir, its mountain ranges the Sierra Nevada in the south and Sierra Morena in the north. Mulhacen, a peak of the former, is 11,678 feet high. The climate is mild, the soil generally fertile, and the country level where not mountainous. The vegetation partakes both of the European and African character. In the south cotton and sugar cane are cultivated. These, with grain, olives, wines, figs, silk, cochineal, wool, and a fine breed of horses, are its chief products. Gold, silver, copper, iron, lead, antimony, sulphur, coal, mercury, vitriol, serpentine marble, and alabaster are found. The mines, rich in antiquity, are now much neglected. The country is parcelled out into vast estates, belonging to the crown, the clergy, and large landed proprietors. Agriculture is in a very backward state. A large part of the plains is devoted to pasturage. The manufactures, once important, have greatly declined; the principal are those of woollens, silk, and leather. The chief cities are Seville, the seat of the captain general, Cadiz, Cordova, Granada, Jaen, Malaga, Almeria, and Huelva, each the capital of a province named after it. The chief ports are Cadiz and Gibraltar. The Andalusians are a mixed race, descended from Phœnicians, Carthaginians, Romans, Goths, Vandals, and Moors, all of which nations are conspicuous in the checkered history of the country. Physically they retain many of the peculiarities of the last-named people. They are animated and naturally intelligent. Trajan, the Senecas, and Lucan were natives of Andalusia. In the middle ages it was the flourishing home of Moslem and Jewish learning; in modern times it has given Spain some of its most illustrious statesmen, painters, and authors.

ANDAMAN ISLANDS, a long, narrow group of small islands in the E. part of the bay of Bengal, in lon. 92° 50′ E., and between lat. 10° and 14° N., about 150 m. S. by W. of Cape Negrais, 100 m. N. of the Nicobar group, and 350 m. W. of the Tenasserim coast; area, about 3,000 sq. m.; pop. in 1870, 9,630. They include the North, Middle, South, and Little Andaman islands, with a number of islets, and are all densely wooded, producing ship timber and ornamental woods. The 1,000 natives are a diminutive and barbarous people, who seem to be distinct from all other known races, and whose language has no apparent affinity with any other tongue spoken in India or the Indian islands. They are seldom more than five feet in height, have protuberant bellies, slender limbs, woolly hair, thick lips, flat noses, and small red eyes. Their color is a deep black. They wear no clothing except a thick plaster of mud, intended to resist the attacks of insects. They live in the most wretched huts, subsist by fishing, never till the ground, have no implements that will resist fire, paint their heads with red ochre, will hold no intercourse with strangers, and are supposed to worship the sun and moon. The British formed a settlement at Port Cornwallis on the largest of the islands in 1793, with the purpose of making a penal colony for convicts from Bengal, but abandoned it three years later on account of the unhealthiness of the climate. After that the group was seldom visited till 1858, when Port Blair on one of the islands was selected as a penal settlement. Here, on Feb. 8, 1872, the earl of Mayo, viceroy of India, was assassinated by a Mohammedan convict, immediately after landing at night for a visit of inspection.

ANDELYS, Les, a town of France, in the department of Eure, on the Seine, 18 m. S. S. E. of Rouen. It properly consists of two towns, Grand Andely on the Gambon and Petit Andely on the Seine; pop. in 1866, 5,161. It is the birthplace of Turnebus and Poussin. Near it was the celebrated fortress Château Gaillard, and a convent founded by St. Clotilde.

ANDENNE, a town of Belgium, in the province of Namur, near the right bank of the Meuse, 10 m. E. of Namur; pop. in 1866, 6,278. It has a convent of the Beguines, and manufactories of pipes and earthenware.

ANDERLECHT, a town of Belgium, in the immediate vicinity of Brussels, of which it may be regarded as a suburb; pop. in 1866, 11,663. At Anderlecht Dumouriez defeated the Austrians on Nov. 13, 1792.

ANDERLONI. I. Pietro, an Italian engraver, born at Santa Eufemia, near Brescia, Oct. 12, 1784, died in Milan, Oct. 13, 1849. After preparatory studies under his father, who was himself an engraver, he entered the school of Longhi at Milan, of which he subsequently became director. His most admired pieces are portraits of Da Vinci, Canova, and Peter the Great; his "Moses with the Daughters of Jethro," after Poussin; his "Virgin," after Raphael; and his masterpiece, "The Woman taken in Adultery," after Titian. **II. Faustino,** brother of the preceding, an engraver of Pavia, born in 1766, died Jan. 9, 1847. Among his works are a portrait of Herder, a Magdalen after Correggio, and a "Holy Family" after Poussin.

ANDERSEN, Hans Christian, a Danish author, born in Odense, April 2, 1805, died in Copenhagen, Aug. 4, 1875. His father was a shoemaker of some literary taste. Andersen's scanty education was chiefly acquired at a charity school. At nine years of age he lost his father, and shortly afterward was taken into the house of the widow of a clergyman, where he was engaged to read aloud to the family. After a short sojourn in a manufactory, where he was ill-treated by the workmen, whom he had amused by singing and reciting to them passages from Holberg, he returned home, and for a while led an inactive life. He possessed an agreeable voice, and his mother was advised to send him to the theatre. She determined, however, to make a tailor of him, but before his apprenticeship commenced he obtained permission to go to Copenhagen and witness the performance of a play. Accordingly, in 1819 he found himself in that city with 10 rix dollars in his pocket, and sought to get an engagement at the theatre in some humble capacity. He was rejected on account of his awkwardness and ignorance, but soon afterward presented himself to Professor Siboni, director of the royal conservatory, who received him with kindness, and caused him to be instructed as a singer for the stage. At the end of half a year his voice, which was in the transition state, failed him. He then applied for assistance to the poet Guldberg, the brother of a former patron in Odense, by whose aid he was enabled to struggle on for a few years, sometimes employed in the theatre and sometimes studying. During this period he wrote some tragedies which excited the attention of Oehlenschläger and others, but which he was unable to have produced upon the stage. Councillor Collin, a benevolent and clear-sighted man, having become director of the theatre, procured his admission free of expense into one of the government schools. This was the turning point in Andersen's life; he embarked in this new career with enthusiasm, was admitted into the royal college of Copenhagen, and while completing his studies there produced in 1829 his first work in print, entitled "A Journey on Foot to Amak," which was received with extraordinary favor, and gained him the acquaintance of some of the most influential people in Copenhagen. Some volumes of poems which succeeded increased his reputation. Oehlenschläger, Ingemann, and other friends having procured a royal stipend to enable him to travel, in 1833 he visited Italy, his impressions of which he has recorded in his novel, "The Improvisatore," which stands unrivalled as a picture of scenery and manners in southern Europe; and he afterward travelled extensively throughout Europe and the East. His next novel, "O. T.," describes life in the north, and "Only a Fiddler" some of the most striking scenes in his early struggles. Among his other works are "Fairy Tales," "Picture Book without Pictures," "Travels in the Hartz Mountains," "A Poet's Bazaar," "Ahasuerus," "New Fairy Tales," and some volumes of poetry, dramas, fairy comedies, and texts for operas. In 1846 he visited England, where he made many friends, and in 1849 wrote one of his longest works, "The Two Baronesses," in the English language. His works reflect his own kindly and open disposition, and are marked by humor, invention, and a poet's enthusiasm. His fairy tales for children have been read with delight in every modern language. He was also an admirable public reader of his own works, enjoying in this respect in Denmark a fame equal to that of Dickens in England and America. In 1845 he received a royal annuity which placed him in comfortable circumstances for the remainder of his life. The series of translations from his works by Mary Howitt and others has introduced him to a large circle of admirers in England and America. The first complete edition of his works in English was published in 1870-'71 in New York, in 10 vols. 8vo, including "The Story of My Life," an autobiography.

ANDERSON. **I.** A N. W. county of South Carolina, separated from Georgia by the Savannah river, bounded N. E. by the Saluda and drained by a number of smaller streams; area, 800 sq. m.; pop. in 1870, 24,049, of whom 9,593 were colored. The Greenville and Columbia and the Blue Ridge railroads traverse the county. The surface is uneven; the soil fertile and well cultivated. The productions in 1870 were 77,169 bushels of wheat, 409,688 of corn, 84,218 of oats, 13,225 of sweet potatoes, 162,842 lbs. of butter, 15,897 of wool, and 5,274 bales of cotton; value of animals slaughtered, $189,982. There were 984 white and 309 colored children attending school. Capital, Anderson. **II.** An E. central county of Texas, bounded W. by the Trinity river, and touching the Neches river on the east; area, 900 sq. m.; pop. in 1870, 9,229, of whom 4,436 were colored. About two thirds of the county is timbered. The surface is rolling and the soil fertile. In 1870 the county produced 177,285 bushels of corn, 22,136 of sweet potatoes, 4,016 bales of cotton, and 49,381 lbs. of butter. Iron ore is abundant. There are about 20 churches and the same number of schools. Capital, Palestine. **III.** A N. E. county of Tennessee, traversed by Clinch and Powell's rivers; area, 600 sq. m.; pop. in 1870, 8,704, of whom 928 were colored. On its northwestern border is Cumberland mountain, and on the southeast rises Chestnut ridge, between which two ranges lies a deep fertile valley, well watered and abundantly stocked with timber. Coal is found in various parts of the county. At Estabrook are salt and sulphur springs. The chief productions in 1870 were 22,932 bushels of wheat, 262,664 of corn, and 73,441 of oats. Capital, Clinton. **IV.** A N. central county of Kentucky, bounded E. by the Kentucky river, and intersected by Salt river; area, 300 sq. m.; pop. in 1870, 5,449, of whom 698 were colored. The surface is level or gently undulating; the soil generally productive. The productions in 1870 were 35,340 bushels of wheat, 300,963 of corn, 33,004 of oats, 19,539 of rye, 15,165 lbs. of tobacco, 18,425 of wool, and 112,341 of butter. Capital, Lawrenceburg. **V.** A S. E. county of Kansas, drained by Potawatamie creek, a branch of the Osage river; area, 576 sq. m.; pop. in 1870, 5,220. The productions in 1870 were 35,769 bushels of wheat, 206,989 of corn, 77,779 of oats, 12,913 lbs. of wool, and 93,485 of butter. Capital, Garrett.

ANDERSON, Alexander, the first wood engraver in America, born in New York, April 21, 1775, died in Jersey City, N. J., Jan. 17, 1870. He was the son of a Scotch printer, who just before the outbreak of the revolution published in New York a republican newspaper, "The Constitutional Gazette," so strongly opposing British rule that when Howe's army entered the city he was obliged to take refuge in Connecticut. At the age of 12 Anderson made his first attempt at engraving on small copper and type-metal plates, having obtained his only instruction by watching jewellers and other workmen. Among his early engravings were some copies of anatomical figures, and his interest in subjects of this kind induced him to begin the study of medicine. He took his doctor's degree at Columbia college in 1796, writing an able thesis on "Chronic Mania," but soon began to devote himself to art studies, finding his first regular employment in the illustration of a little book, "The Looking-Glass for the Mind." Hearing of the method of Bewick, the English engraver, he began to use boxwood blocks, though for some years employing copper in the greater part of his work. He invented his own tools for wood engraving, since none existed in America at the time he began the experiment. After 1812 he engraved only upon wood, and attained great skill. He illustrated many standard works; among the earliest was the first edition of Webster's spelling-book. He was for many years employed in illustrating the American tract society's publications, retiring in 1865, at the age of 90, till which time he had retained his skill and mental powers almost unimpaired.

ANDERSON, Sir Edmund, an English judge, born in Lincolnshire about 1540, died Aug. 1, 1605. He was made chief justice of the common pleas in 1582, and distinguished himself by his zeal for the established church and his harshness toward dissenters. He was one of the commissioners for the trial of Mary queen of Scots, and afterward of Raleigh. His "Reports of Cases argued and adjudged in the time of Queen Elizabeth, in the Common Bench" (fol., London, 1644), and "Resolutions and Judgments on the Cases and Matters agitated in all the Courts of Westminster in the latter end of the Reign of Queen Elizabeth" (4to, London, 1655), are much esteemed.

ANDERSON, James, a Scottish antiquary and lawyer, born in Edinburgh, Aug. 5, 1662, died April 3, 1728. In 1705 he published "An Essay showing that the Crown of Scotland is Imperial and Independent," in answer to a pamphlet which had appeared a short time before. For this he received the thanks of the Scottish parliament, besides a present in money, and a commission to collect and publish ancient documents illustrative of the national independence. Soon after the union of the two kingdoms he removed to London, where he employed himself in literary labors and in endeavoring to obtain a recognition of his claims on the government; and from 1715 to 1717 he was postmaster general of Scotland. He published "Collections relating to the History of Mary, Queen of Scotland" (4 vols. 4to, 1727-'8). His "Royal Genealogies, . . . from Adam to these Times," appeared after his death (1732), as also his great work, *Selectus Diplomatum et Numismatum Scotiæ Thesaurus* (1739), edited by Ruddiman.

ANDERSON, James, a Scottish writer on agriculture, political economy, and natural science, born at Hermiston, near Edinburgh, in 1739, died Oct. 15, 1808. At the age of 15, having lost his parents, he assumed the charge of the paternal farm, and he was still very young when he introduced among the farmers of his neighborhood the two-horse plough without wheels. In 1763 he took a lease of 1,300 acres of nearly wild land in Aberdeenshire, and in 1771 contributed to the "Edinburgh Weekly Magazine" a series of essays on planting, which were in 1777 collected and published separately. In 1780 he received from the university of Aberdeen the degree of doctor of laws, and in 1783 removed to Edinburgh. In 1784 he was employed by the government to make a survey of the Hebrides and the western coast of Scotland, with a view to the improvement of the fisheries. In 1791 he established a literary and scientific periodical called the "Bee," designed especially for the young. Having removed to the neighborhood of London in 1797, he commenced in April, 1799, a periodical entitled "Recreations in Agriculture," which continued until March, 1802, and of which he wrote the most valuable papers.

ANDERSON, John, a Scottish professor, founder of the Andersonian university at Glasgow, born in the parish of Roseneath, Dumbartonshire, in 1726, died Jan. 13, 1796. In 1756 he was appointed professor of oriental languages in the university of Glasgow, and in 1760 professor of natural philosophy. He established a gratuitous course of popular scientific lectures. By his will he directed all his property to be applied to found an institution for the education of the poorer classes. Though this institution was conducted first on a small scale, it has since increased its means of usefulness, and now has 14 professors and lecturers, with courses of instruction in surgery, chemistry, institutes of medicine, materia medica, anatomy and physiology, medical jurisprudence, natural philosophy, botany, the classics, and Hebrew, French, and music. In 1786 Dr. Anderson published "Institutes of Physics" for popular use, which passed through five editions in ten years.

ANDERSON, Martin Brewer, LL. D., an American educator, born in Brunswick, Me., Feb. 12, 1815. He graduated in 1840 at Waterville college, Me., where, after studying about a year in the theological seminary at Newton, Mass., he became a tutor of Latin, Greek, and mathematics. In 1843 he was appointed professor of rhetoric, but continued to give instruction in Latin, and organized and taught a course of modern history. In 1850 he resigned his professorship, and became proprietor and editor of the "New York Recorder," a weekly Baptist journal. In 1853 he was called to the presidency of the then newly founded university of Rochester, which position he still holds (1880). He has preached much, though never ordained as a clergyman, and has contributed literary and philosophical articles to various public journals.

ANDERSON, Mary. See supplement to this volume.

ANDERSON, Robert, an officer of the U. S. army, born at "Soldiers' Retreat," near Louisville, Ky., June 14, 1805, died at Nice, France, Oct. 26, 1871. He graduated at West Point in 1825, entered the 3d artillery, and served in the "Black Hawk war" of 1832. In 1835-'7 he was instructor of artillery at West Point, afterward served in the Florida war, and in May, 1838, became assistant adjutant general on the staff of Gen. Scott. In 1841 he resigned this appointment on his promotion to a captaincy. He accompanied Gen. Scott to Mexico in 1847, and was severely wounded at Molino del Rey. In 1857 he was promoted to be a major in the 1st artillery. On Nov. 20, 1860, he assumed command in Charleston harbor, S. C. On the night of Dec. 26, expecting an attack by the authorities of South Carolina, he removed his small garrison from Fort Moultrie to the stronger Fort Sumter, where during the next 3½ months he was closely invested by the confederate troops. On April 13 he evacuated the fort after a bombardment of nearly 36 hours, during which he lost none of his men by the fire of the enemy, marched out with his 70 men with the honors of war on the 14th, and sailed the next day for New York. In May, 1861, he was appointed brigadier general in the U. S. army, and commander of the department of the Cumberland, but in consequence of failing health he was soon relieved, and afterward breveted major general in the regular army, and retired from service. In 1868 he went to Europe for the benefit of his health. He translated and adapted from the French "Instructions for Field Artillery, Horse and Foot, arranged for the Service of the U. S. Army," and "Evolutions of Field Batteries of Artillery," now used by the war department.

ANDERSONVILLE, a village of Sumter co., Ga., on the Southwestern railroad, 62 m. S. of Macon; pop. in 1870, 1,346. It was during the war the seat of a Confederate States military prison, established by Capt. W. S. Winder, Nov. 27, 1863, at which time the population of the neighborhood did not exceed 20 persons. The site selected was a pine and oak grove of about 22 acres, on the side of a hill of red clay, 1,600 feet E. of the railroad. Near the base of the declivity was a stream of unwholesome water about 5 feet wide and not more than 6 inches deep. The trees were cut down and the enclosure was surrounded by a strong stockade 15 or 18 feet high. It was originally a parallelogram, 1,010 feet long by 779 feet wide, but in the summer of 1864 its length was increased to 1,620 feet. At the distance of 120 feet, surrounding the inner enclosure, was another palisade of rough pine logs, and between the two were sentry boxes overlooking the interior. A cordon of connected earthworks mounted with 17 guns, commanding the entire prison, surrounded the outer palisades. A wooden railing about 3 feet high around the inside of the stockade, and at an average distance of 19 feet from it, constituted the "dead line," prisoners passing which were summarily shot. The stream above mentioned passed from W. to E. through the enclosure, and furnished the only water for washing accessible to the prisoners. Many acres bordering the stream on either side were trodden by the feet of the prisoners into a deep and filthy mire. Deducting the quagmire thus formed, about 300 feet wide, and the space cut off by the "dead line," the remaining space before the enlargement comprised about 12 acres, giving to each prisoner when the number reached 30,000 an average area of about 17 square feet. A small shed, covered but not enclosed, furnished the only protection from the inclemency of the weather. A few wells were sunk in the prison, and there were also a few springs. A second enclosure, 925 feet long and 400 feet wide, similar to the prison, was constructed in June, 1864, for a hospital; with the exception of a few old tents, it contained nothing but long sheds made of poles, with roofs of pine boughs or planks, and without sides. The bakery was within the two lines of palisades, and the cook house was 200 yards outside. On the high land overlooking the prison were a two-story building for the confederate officers and men, and the huts for the guards, who numbered from 3,000 to 5,000. Near the railroad station a stockade measuring 195 by 108 feet was constructed, and for a while used as a prison for officers; but they were subsequently confined at Macon. Between the graveyard and the stockade stood a small hut in which nine bloodhounds were kept. The graveyard was situated about 300 yards N. W. of the stockade. Trenches varying in length from 50 to 100 yards having been dug, the bodies were laid in rows of 100 to 300 and covered with earth. At the head of each body a wooden stake was planted by the federal soldiers detailed to bury their companions, and each stake bore a number corresponding with a similarly numbered name upon the hospital record. The first detachment of federal prisoners was received at the Andersonville prison Feb. 15, 1864. Soon afterward John H. Winder, a brigadier general in the confederate army, assumed command of the post, with his son, W. S. Winder, as adjutant. The superintendence and management of the prison were assigned to Henry Wirz, a Swiss by birth. The following exhibit from the prison records shows the number and mortality of prisoners:

Total number received at prison	49,485
Largest number in prison at one time, Aug. 9, 1864	33,006
Total number of deaths as shown by hospital register	12,462
" " " in hospital	8,735
" " " in stockade	3,727
Percentage of deaths to whole number received	26
" " to number admitted to hospital	69 1/17
Average number of deaths for each of the 13 months	958
Largest number of deaths in one day, Aug. 23, 1864	127
Cases returned from hospital to stockade	3,469
Total number of escapes	823

DATE.	Total number at end of each month.	Number of deaths.	Average daily deaths.	Ratio of deaths to living.	Per cent. of deaths per month based on number in prison each month.
1864. March	4,603	283	....	.....	....
April	9,577	592	....	1:16	6
May	18,454	711	23	1:26	4
June	26,367	1,203	40	1:22	4
July	31,678	1,742	56	1:18	5
August	31,693	2,993	97	1:11	9
September	8,218	2,700	90	1:3	3
October	4,208	1,560	50	1:2	18
November	1,359	485	....	1:2	11
December	4,706	160	....	1:29	3
1865. January	5,046	200	....	1:25	4
February	5,851	149	....	1:39	2
March	3,319	118	....	1:28	2
April	51	32	....	1:2	3
		12,926			

Principal diseases and number of deaths resulting therefrom:

Diarrhœa	3.952	Gun-shot wounds	149
Scurvy	3,574	Pleurisy	109
Dysentery	1,648	Bronchitis	93
Unknown	1,263	Rheumatism	83
Anasarca	377	Varioloid	68
Typhoid fever	229	Gangrene	63
Pneumonia	221	Catarrh	55
Debility	193	Ulcers	51
Intermittent and remittent fevers	177	Phthisis	36

In August, 1864, Dr. Joseph Jones, professor of chemistry in the medical college of Georgia, under the direction of the surgeon general of the confederacy, was sent to Andersonville to investigate the nature and cause of the sickness prevalent there, "for the benefit of the medical department of the Confederate States armies." The order, dated at Richmond, Aug. 6, 1864, recited that "the field of pathological investigation afforded by the large collection of federal prisoners in Georgia is of great extent and importance, and it is believed that results of value to the profession may be obtained by a careful investigation of the effects of disease upon the large body of men subjected to a decided change of climate and the circumstances peculiar to prison life." Dr. Jones reported that scurvy, diarrhœa, dysentery, and hospital gangrene were the prevailing diseases; that there were few cases of malarial fever and no well marked cases of typhus or typhoid fever. The absence of the different forms of malarial fever was accounted for by the supposition that the artificial atmosphere of the stockade, crowded densely with human beings and loaded with animal exhalations, was unfavorable to the existence and action of the malarial poison. Subsequently, at the suggestion of Gen. Winder, an investigation was made by Dr. G. S. Hopkins and Surgeon H. E. Watkins, who reported the general causes of diseases and mortality as follows: "1. The large number of prisoners crowded together. 2. The entire absence of all vegetables as diet, so necessary as a preventive of scurvy. 3. The want of barracks to shelter the prisoners from sun and rain. 4. The inadequate supply of wood and good water. 5. Badly cooked food. 6. The filthy condition of the prisoners and prison generally. 7. The morbific emanations from the branch or ravine passing through the prison, the condition of which cannot be better explained than by naming it a morass of human excrement and mud." Early in May, 1864, a report upon the condition of the prisoners was made by the confederate surgeon E. J. Eldridge, pursuant to instructions of Gen. Howell Cobb, and on July 5 an inspection report was submitted by Col. Chandler of the confederate war department. In these reports the sickness and mortality of the prisoners were attributed to the bad condition of the prison and its management. In August, 1865, a special military commission was convened by the secretary of war to try Wirz. The indictment charged him with injuring the health and destroying the lives of soldiers confined as prisoners at Andersonville, by subjecting them to torture and great suffering, by confining them in unhealthy and unwholesome quarters, by exposing them to the inclemency of the winter and the dews and burning sun of the summer, by compelling the use of impure water, and by furnishing insufficient and unwholesome food; also for establishing the "dead line," and ordering the guard to shoot down any prisoner attempting to cross it; for keeping and using bloodhounds to hunt down prisoners attempting to escape; and for torturing prisoners by confining them within the "stocks." Wirz, having been found guilty on these charges, was hanged Nov. 10, 1865. After the close of the war the cemetery at Andersonville was arranged by Col. Moore of the U. S. quartermaster's department, pursuant to orders from the secretary of war. The stakes were removed and neat head boards, inscribed in black letters, with the names of the dead were substituted. The bodies in the trenches were found to be from two to three feet below the surface, and in some instances, where the rain had washed away the earth, but a few inches. They had been buried without coffins or the ordinary clothing, and not more than 12 inches in width had been allowed to each body. With the aid of the hospital record, 12,461 graves were identified and marked with tablets giving the number, name, rank, regiment, company, and date of death of each person; and 451 graves bore the inscription "Unknown U. S. Soldier." The cemetery was carefully laid out in walks and adorned with trees.

ANDERSSEN, Adolph, a German chess player, born in Breslau, July 6, 1818. He was a teacher of mathematics, acquired in Berlin a high reputation as a chess player, and attended in 1851 the chess tournament in London, where he defeated Staunton and other English celebrities. In December, 1858, he was defeated in Paris by Paul Morphy; but in 1862, at the second London chess tournament, he obtained the highest prize. He is the author of many original outlines of games and of writings on the theory of chess, published in the Leipsic *Schachzeitung*.

ANDERSSON, Carl Johan, a Swedish traveller, born in the province of Wermland in 1827, died in the territory of the Ovacuambi, S. W. Africa, July 5, 1867. He was the natural son of Mr. L. Lloyd, an English sportsman residing in Sweden. In 1849 he went to England, and the next year joined Francis Galton in a journey to the territories of the Damaras and the Ovambos, S. W. Africa. He continued his explorations alone in 1853-'4, and published after his return to England (1855) "Lake Ngami, or Explorations and Discoveries during Four Years' Wanderings in the Wilds of Southwestern Africa." Revisiting Africa in 1856, he made a second journey to Lake Ngami (1858) in company with Mr. Green, an English elephant hunter, and found his way up the Okavango, through the territory of the Ovambo, one of the principal red tribes of Herrevo land, which had never been visited by a European excepting by the German missionary Hugo Hahn. He published in London in 1861 a work on the Okavango river. Returning to Herrevo land by way of Walfish bay and the Zwachaub river, he married Miss Aitchison of Cape Town, and devoted himself at Otjimbingue, near Ondongo, to agriculture and commerce. During the war with the Damara and Namaqua tribes he was repeatedly despoiled by the latter, and finally so seriously wounded that he had to be removed to Cape Town. During his illness he studied ornithology and prepared materials for an illustrated fauna of S. W. Africa. Barely recovered, he set out again in May, 1866, with a young Swede, on an expedition to the Cunene, with a view of establishing commercial intercourse with the Portuguese settlements N. of that river, and came within sight of the long-sought stream; but, too feeble to cross it, he had to retrace his steps and died on the home journey.

ANDERSSON, Nils Johan, a Swedish botanist, born Feb. 20, 1821. He made a voyage round the world in the Swedish frigate Eugenie in 1851-'3, and published *Verldsomsegling* (3 vols., Stockholm, 1853-'4). He also wrote on Scandinavian botany. Since 1856 he has been professor at Stockholm, and superintendent of the botanical collection of the academy of sciences.

ANDES, the range of mountains which extends along the northern and western coasts of South America, from the southern extremity of the continent to the Caribbean sea. It is the most compact mountain system in the world. Skirting the Pacific shore for nearly 4,500 m., with a mean elevation of 12,000 feet and varying in breadth from 40 to 350 m., it covers with its base a surface of more than half a million square miles. Nowhere else does nature present such a continuous, well defined, and lofty chain. It is in strong contrast with the broken and straggling systems of Europe and North America. The Himalayas surpass the Andes in extreme altitude, but as they are situated beyond the tropics and destitute of volcanoes, they do not present that inexhaustible variety of phenomena which characterizes the latter. Though presenting one continuous axis, the Andean range consists of several members, known by the names of the countries in which they occur. The Patagonian section is a single narrow range of moderate elevation, but ascending in several points (Mt. Darwin, Mt. Stokes, and the volcanoes of Yantéles and Minchinmadiva) to 6,400 and 8,000 feet. It begins in a group of mountainous islands, the archipelago of Tierra del Fuego; and, indeed, the western side throughout its whole length is penetrated by narrow inlets or arms of the sea and bordered by a series of rugged islands. This Pacific side, exposed to the prevailing winds, is of barren rock; but the eastern slope is covered with forests of beech (*fagus betuloides*), which reach up to 1,000 or 1,500 feet above the sea level; and beyond this succeeds a belt of dwarfed alpine plants and peat mosses, which continues to the height of 3,500 or 4,000 feet, the limit of perpetual snow. Almost every arm of the sea, says Darwin, which penetrates to the interior higher chain, not only in Tierra del Fuego, but on the coast for 650 m. northward, is terminated by tremendous and astonishing glaciers. Great masses of ice frequently fall from these icy cliffs, and the crash reverberates like the broadside of a man-of-war through the lonely channels. The glacier furthest from the pole which comes down to the sea, surveyed during the voyages of the Adventure and Beagle, is in lat. 46° 50′ S., in the gulf of Peñas.—As the Andes enter Chili they begin to recede from the ocean, and a fertile belt of country intervenes, which in lat. 36° is about 100 m. wide. They still form one immense ridge, but they gain in height and breadth. Though in mean elevation they are inferior to the Andes of the north, they yet contain the gigantic Aconcagua, the culminating point of the whole system, and the highest mountain in the new world. It is frequently called a volcano, but it shows no trace of modern igneous origin, although it is porphyritic. Its height was computed by Capt. Beechey from its angle of elevation at Valparaiso to be 23,910 feet; but the more exact measurement of M. Pissis makes it 22,422. Other Chilian peaks are Tupungato, Antuco, Villarica, Chillan, Maypu, and Osorno, some of which, if not all, are volcanic. The snow line in the latitude of Valparaiso is about 15,000 feet above the sea. "To this line," Darwin observes, "the even summits of the range seemed quite parallel. Only at long intervals a group of points or a single cone showed where a volcano had existed or does now exist. Hence the range resembled a great solid wall, surmounted here and there by a tower, and making a most perfect barrier to the country."—The Bolivian Andes extend from about lat. 24° to 15° S. For some distance there is but one undivided range as in Chili, between which and the Pacific is the vast desert of Atacama, doubtless the bed of an ancient sea. At the mountain knot of Alturas de los Lipes, lat. 22°, the chain separates into two great longitudinal ridges, called the Cordillera of the coast and the Cordillera Real, which enclose the wonderful table land of Desaguadero, the Thibet of the new world. This high valley, elevated 13,000 feet above the sea, extends 500 m. in length and from 30 to 60 in breadth along the top of the Andes. It is so completely walled in that the streams have no apparent outlet, but meet in Lake Titicaca. The surface of this lake is 12,846 feet above the Pacific. It is the largest fresh-water accumulation in South America, covering 4,600 sq. m. and having a depth of at least 120 fathoms. The Rio Desaguadero connects it with the Laguna Aullagas, 180 m. S., which is about 50 feet lower than Titicaca. The valley enjoys a temperate climate, but it is treeless and cultivation is limited. Yet large cities have flourished at this altitude. Potosi, famed for its silver mines and for being the most elevated city on the globe, two centuries ago contained 150,000 inhabitants. Its altitude is 13,330 feet. The cerro on which it is situated is honeycombed by mining operations, over 5,000 *boca-minas* being visible. To the N. E. of it is Chuquisaca or Sucre, the capital of Bolivia, in the midst of cultivated fields. La Paz, a few leagues from the southern extremity of Lake Titicaca, is situated in a *quebrada*, or ravine, 620 feet below the lake, and still over 12,000 feet above the sea. The water that flows through the quebrada of La Paz winds around the volcano of Illimani, and, flowing northward and uniting with other branches, becomes with them one of the great tributaries of the Amazon. Nine fine bridges cross this ravine in the city. The Cordilleras run parallel to each other, from 200 to 300 m. distant; the eastern range has a mean elevation of 13,500 feet, and the western 14,800. They are united at various points by enormous transverse mountain dikes or knots. The highest summits in the coast range are Sahama, 22,350 feet; Parinacota and Gualatieri, 22,000 each; Pomarape, 21,000; and the active volcano Arequipa, 20,300. The loftiest peak in the Cordillera Real is that of Sorata, 21,286 feet; and near by is its rival, Illimani, only 100 feet lower. The Pacific slope of this section of the Andes is sandy and barren. In a day's journey into the interior from the port of Iquique in Peru, not a sign of vegetation is met with except lichens strewed loosely upon the sand with nothing to attach them to the surface; nor is the solitude of the desert interrupted by any living thing, bird, beast, or insect, save the occasional train of cargo mules between the coast and the nitrate of soda mines, and the vultures that hover over them, or settle down to feed upon their prey broken down and left behind. The salts of soda (common salt, and the nitrate with some sulphate) are intermixed with the sand, forming hard incrustations, which, though highly attractive of moisture, find in this dry climate not enough of it to cause them to deliquesce. Where worked, at a distance of about 40 m. from the coast, they are in a hard stratum, between 2 and 3 feet thick, found just beneath the surface, and extending along the margin of a great basin or plain for 150 miles. —The Bolivian plateau terminates in the knot of Vilcañota, where the Cordilleras unite, but again diverge as they traverse Peru, and at the same time change from a meridional to a northwesterly course. They stand over 100 miles apart, and bound the diversified plain of Cuzco, a populous and fertile region. Though under the burning sun of the tropics, this region, the territory of the ancient incas of Peru, enjoys the climate and fruits of the temperate zone. Through the range of the mountain valleys, extending from Potosi in Bolivia in a northwesterly direction, taking in the lakes of Aullagas and Titicaca, and the river Desaguadero, which connects them, and reaching beyond Cuzco, are still to be found the ruined works of the ancient inhabitants, the evidences of their high degree of civilization. These are the wonderful roads which Humboldt in his *Vues des Cordillères* speaks of as among the most useful and stupendous works ever executed by man. They passed over the snowy summits of the sierras, through the mountains by tunnels cut in the solid rock, over the precipices by steps, and the awful *quebradas* (or chasms) and rivers by solid masonry, or by bridges swung by osier ropes. With the same bold engineering, their aqueducts for irrigating the dry soil of the valleys brought water for hundreds of miles from distant sources in the mountains. In these valleys, the grains of the temperate latitudes, as wheat and barley, are still cultivated; and as the table land descends toward the north, sugar cane and other tropical plants appear, but the main ridge of the Andes still towers to great heights between these interior valleys and the Pacific coast. The highest known pass is from Lima in lat. 12° to Tarma and Pasco; it crosses the ridge at an elevation of 15,760 feet. The rain clouds swept on from the N. E. are intercepted on the eastern slopes, and the drainage is all back toward the Atlantic, whence the abundant waters have been brought by the trade winds. The strip of land 20 to 50 m. wide along the coast is singularly dry; no rains reach it from over the mountains, and the vapors raised along the Pacific are driven by the prevailing winds from its shores. The high table lands of Pasco, about lat. 11° S., are famous as the highest points of the Andes occupied by man. Here are worked some of the richest silver mines of Peru, at an elevation of 14,000 feet, and only 1,500 feet below the line of perpetual snow. From this point for 400 m. northward, to the Andes of Quito, the mountains decline in height, and no peak for more than 7° S. of the equator reaches the line of perpetual snow. The Andes crowd more closely on the coast, so that the rains that swell the sources of the Amazon fall within sight of the Pacific; yet they spread in parallel N. and S. ridges over a vast width of country, and between the different ranges the great branches of the Amazon, as the Marañon, the Huallaga, and the Ucayali, find their way in a northerly direction to enter at right angles the main river bound on its eastern course. The valleys of these rivers afford convenient situations for roads, and they are connected with the coast by various passes over the western summits; one of the principal of these is the road from Truxillo, in lat. 8° S. on the coast, to Caxamarca in the valley of the Marañon, over a summit of 11,600 feet elevation. Thence the road continues northward to Chachapoyas, and from this place over the central ridge of the Andes to Moyobamba and Tarapoto on the Huallaga. All this fine region of the Andes, with its numerous towns and rich mines, is occupied principally by Indians. Farming and mining are almost their only employments. Except silver, products of the mountains hardly pay for transportation; the most important are the bark of the cinchona tree, which abounds in the forests on the eastern ranges, and the sarsaparilla, which is very common in the densely wooded plains of the rivers east of the mountains. North of the silver mines of Pasco, the Peruvian Andes may be said to consist of three cordilleras, known as the western, central, and eastern, of which the first is the highest, and is separated from the Pacific by an arid desert 50 m. in breadth. The summit of the Andes of Peru is the Nevado de Sasacuanca, 17,900 feet. While the snow line in Bolivia, according to Pentland, is at 17,000 feet, in Peru it descends to 15,500.—Following these ranges, we find them decreasing in altitude till they terminate in the knot of Loja, one of the lowest parts of the chain. Here begins the most magnificent series of volcanoes in the world—the Andes of Quito. Two cordilleras, running nearly due N., enclose the beautiful table land of Quito, 200 m. long by 30 wide. This table land is divided by the transverse ridges of Assuay and Tiopullo into the three basins of Cuenca, Ambato, and Quito, having the mean altitude and temperature of 7,500, 8,000, and 9,500 feet, and 62°, 61°, and 59°, respectively. The Alto de Tiupullo, or Chisinche, forms the watershed between the Pacific and Atlantic, the waters of the Quito valley flowing W. by the Esmeraldas, and those of Ambato reaching the Amazon by the Pastaza. The eastern or Royal Cordillera contains the ever-active volcano of Sangai, 17,120 feet; ruined Altár, 17,400; the perfect cone of Tunguragua, 16,579, silent since 1780; the Llanganate mountains, rich in gold; Cotopaxi, 18,862 feet—"the most beautiful and most terrible of volcanoes;" the extinct Antisana, 19,279; square-topped Cayambi, standing exactly on the equator, 19,358; and Imbabura, which in 1691 poured forth a vast quantity of mud and thousands of fishes (*pimelodes cyclopum*). In the coast range are Chimborazo, with its untrodden dome, 21,420 feet above the sea; Caraguirazo, about 18,000; Iliniza, 17,370; and Pichincha, 15,827—the only active volcano in this cordillera, and having the deepest crater on the globe. The snow limit at the equator is 15,800 feet. One degree north of the equator is the volcanic knot of Los Pastos, where the cordilleras unite, again to diverge as they enter Colombia. There the Andes spread out "like the graceful branches of the palm tree." The coast range, la Cordillera de la Costa, divides the valley of the Cauca from the Pacific, and finally merges in the low mountains of Darien. About 120 m. N. of the equator, the other cordillera separates into two chains, of which the easternmost, Suma Paz, runs by Lake Maracaibo and terminates near Caracas on the Caribbean sea. The central chain of Quindiu divides the Cauca and Magdalena, and culminates in the volcanic Tolima, 18,270 feet, the highest peak in the new world N. of the line, and situated further from the sea (120 m.) than any other active volcano.—In general, the Andes present a steep slope toward the Pacific, and descend gradually into the vast plains of the east. In Ecuador, the western slope (according to Prof. Orton) is 225 feet per mile, and the eastern 125 feet. In Chili, says Darwin, the descent on the E. side of the cordillera is much shorter or steeper than on the Pacific side. Besides the longitudinal valleys between the cordilleras already mentioned, there are innumerable valleys of erosion on the sides of the Andes in keeping with their colossal size. The gigantic mountain chain, throughout its entire length, forms a great barrier to the interchange of life and commerce between the eastern and western sides of the continent. No river crosses it, and even the separate cordilleras are broken at few points. The passes are wild paths, narrow, steep, rugged, and often running along the edge of precipices. Man has done little to improve them, except in the elevated plains of Peru, where the incas laid out four grand roads from their favorite capital, Cuzco, which rival the similar works of the old Romans. The least elevation of these passes is rarely less than twice the height of Mount Washington. If it does not reach above the extreme limits of vegetation, it is a favorable pass. Frequently they lead through the regions of perpetual snow, and during the winter months are entirely closed. In Chili there are eight of these passes, S. of lat. 32° S., of which the chief are the Uspallata and Portillo, leading from Valparaiso to Mendoza, and reaching the altitude of 12,450 feet. There are six passes in Bolivia, of which the best is by Cochabamba leading to the Mamoré; its highest point is 15,000 feet. Peru may be crossed by three paths: from Lima to Mayro, via Cerro Pasco and Huánuco; from Lima to Tingo Maria, via Huánuco; and from Truxillo to Moyobamba, via Chachapoyas. One leading from Lima to Tarma and Pasco is 15,700 feet high, the highest pass in the Andes. Ecuador is generally crossed via the Arenal on Chimborazo, 14,250 feet, and Papallacta. The maritime chain in New Granada, though low, has but few and difficult passes. From Truxillo to Popayan a great commercial road for mules runs longitudinally along the Andes. The finest carriage ways in western South America are in the Quito valley.—There is a marked difference between the vegetation, the quadrupeds, and to some degree the birds and insects on the eastern side of the Andes and those on the western. This fact accords with geological history; for these mountains, says Darwin, have existed as a great barrier since the present races of animals have appeared; and therefore, unless we suppose the same species to have been created in two different places, we ought not to expect any closer similarity between the organic beings on the opposite sides of the Andes than on the opposite shores of the ocean. The characteristic forms of animal life on the Andes are llamas, vicuñas, alpacas, condors, and humming-birds; nearly all the domesticated animals are importations. The puma, jaguar, peccary, deer, opossum, monkey, squirrel, weasel, and a small black bear abound in the lower altitudes. The population of the Pacific states, consisting of Indians (Aymará in the southern and Quichua in the northern half) and Spanish Americans, is mainly gathered in the high valleys. Near Ocururo in Peru is the little post hut of Rumihuasi, on a wild, forbidding height 420 feet higher than the summit of Mont Blanc—the loftiest habitation in the world.—Ascending the equatorial Andes, we find every variety of climate arranged in zones according to the altitude, and characterized by floral life. From the bananas and palms on the steaming lowlands, we pass in succession tree ferns, cinchona, *polylepis* (the last of the trees), heaths, gentians and geraniums, *paja* (the long wiry grass of the paramos), and lichens. The most prominent flowers in the Quito valley belong to the *compositæ*, *labiatæ*, *leguminosæ*, and *gentianaceæ*. The Andes pass from the hot climates of the equatorial regions through the southern temperate zone nearly to its extreme verge. At their termination, in lat. 56° S., the climate is indeed more boisterous and wintry than that just over the limit of the frigid zone in the northern hemisphere. In the summer season, at Tierra del Fuego, the warmth is insufficient to lift the line of perpetual snow higher than 3,500 or 4,000 feet above the level of the sea, while in Norway for such a climate one must go from 11 to 14 degrees further from the equator. As the Andes toward the north spread out into broader masses, and stretch upward to higher elevations, they carry with them through the tropics the cold temperature of their southern termination. But the mountains are not only the regulators of the climate, they are also the great condensers, lifted up into the higher regions of the atmosphere to catch the abundant moisture distilled by the trade winds, and to shed it in copious streams from the eastern slopes on which it is precipitated, eastward toward the Atlantic, feeding the great rivers of the continent, and spreading fertility along their paths.—Glaciers are rare, being found only in the narrow ravines of the southern section. The volcanoes of the Andes, 51 in number, are remarkable for their continuity, in scattered groups, from the western coast of Patagonia, in lat. 43° 28′ S., to the northern limits of the Andes a few degrees from the equator; and even into Central America the continuation of this volcanic belt may be traced in the cordilleras of Costa Rica, Nicaragua, Honduras, and Mexico. The most southern group extends from Yantéles, opposite the island of Chiloe, to Coquimbo, in lat. 30°. There is then a space of more than eight degrees of latitude with no volcano known to have been in action, to which succeeds the range of volcanoes of Bolivia and Peru, the extent of which is from lat. 21° to 15° S. Thence to the volcanoes of Quito is a district of fourteen degrees of latitude, little known and thinly populated. No volcanoes are spoken of in it, but they may be there and have escaped the observation of civilized man. The volcanoes of Quito extend from 100 m. S. of the equator to 130 m. N. of it; and from their northern termination it is about six degrees further to the southern termination of the volcanoes of Central America. They are not only remarkable for the long line of country they spread over, but also for the great height of many of the peaks, and their extremely destructive character. The products of an eruption are usually water, mud, ashes, and fragments of pumice, trachyte, and porphyry. But the volcanoes of the Andes are singularly exempt from floods of lava. From high up the flanks of Antuco in Chili, the summit of which rises 16,000 feet above the sea, immense currents of lava flowed in 1828; but this is a rare occurrence, the matters usually ejected being vapors and scoriæ. The outbursts of the volcanoes are closely connected with the frequent and disastrous earthquakes of this region. These commotions appear to extend under the whole range of the Andes, and even far out under the ocean. So frequent are they that M. Boussingault is of opinion that a full register of them would show that they are incessant.—The geological structure of the Andes shows that the chain was slowly upheaved in mass from the sea, and has since undergone three subsidences. Indeed, there are evidences that the Andes are now subsiding again, for successive measurements indicate a lower elevation. (See "American Journal of Science," October, 1871, p. 267.) In the pass of Uspallata, the two parallel ridges, based on the ancient porphyries, are capped, the range next the coast with black clay slates containing the grypheas, ammonites, and other fossil shells of jurassic and cretaceous age, and altered by intrusion of the igneous rocks; while the eastern range is covered with still later formations, as sandstones and conglomerates made up of the fragments of the rocks of the western range, and bearing all the appearance of the tertiary strata found along the Pacific coast. These later formations also are intermingled with trap rocks and volcanic tuffs, and altered by contact with the granitic rocks, which since the deposition of the sedimentary rocks have intruded among the strata. The metallic veins from the granite also penetrate them, and veins of gold have been worked in close proximity to fossil trunks of trees, found by Darwin standing imbedded in the stratified rocks. The Andes appear throughout their length to carry a similar geological structure, which is made manifest as well by a similarity of mineral productions as by the reports of those naturalists who have ascended the summits; granitic and porphyritic rocks form the lower portion, and on these rest immense formations of mica slate, gneiss, and quartz rock. Upon the very summits are found the tertiary strata, which, like the same formation extending along the Pacific coast, are productive in beds of bituminous coal, and the variety called brown coal, at intervals from Patagonia to Panama. Beds of this coal are worked in Chili for the use of steamships; and in the mining region of Pasco in Peru, in the immediate vicinity of its celebrated silver mines, and at an elevation of over 14,000 feet, coal probably of the same age is found in abundance. The quality of such coal is not likely to be as good as of the bituminous coals of the true coal formation, but our data are very imperfect on this point, as also whether the real carboniferous rocks are found at all in South America. The secondary rocks generally cover the granite in the mountains of Venezuela, but thin away toward the equator; and in the plains of the Rio Negro Humboldt noticed the bare granite in patches of 10,000 square yards forming the level surface. Mines of silver have frequently been alluded to in describing different localities along the Andes. Near the equator and N. of it they are not productive; but in Peru and Bolivia they are probably unsurpassed in richness by any mines of this metal in the world. The mines of cinnabar of Huanca Velica, in southern Peru, have in former times produced very large quantities of mercury, and the same ore is also found near Tarma in the valley of the Jauja river, and in the equatorial Andes, N. W. of Cuenca; platinum is met with in small grains in the alluvium near the Pacific coast of New Granada. Gold is found in the silver veins of Peru, and is worked in veins in Chili. In Bolivia it is washed from the deposits along the streams. Lead ores are common with those of silver, but are not regarded as of much value. The copper mines of Chili are very productive in the rich oxides and carbonates of this metal. Many cargoes of these valuable ores are shipped every year to Swansea in Wales to mix with the lean ores of Cornwall; and our own copper-smelting establishments along the coast receive occasional supplies from the same source. The production of Chili, and of Peru also, in these ores might be largely increased, were there better facilities for getting the ores to the coast, or were there convenient supplies of fuel for converting them into products more economical for shipment. The nitrate of soda mines of Peru have already been noticed. The finest gem of the Andes is the emerald, the Tunca mines near Bogotá furnishing nearly all in the market.—The name Andes, according to Garcilasso, is derived from *Anti*, the name of an ancient province E. of Cuzco. Others think it may have come from the aboriginal word *anta*, copper, this metal being so abundantly distributed through the mountains. Col. Tod, in his work on Rajasthan, notices that the northern Hindoos apply the name Andes to the Himalaya mountains. But Humboldt says there are no means of interpreting it by connecting it with any signification or idea; if such connection exist, it is buried in the obscurity of the past.—See "The Narrative of the Ten Years' Voyage of H. M. Ships Adventure and Beagle," by Captain King, Captain Fitzroy, and Charles Darwin (London, 1839); Darwin's "Geological Observations on South America" (London, 1846); "The U. S. Naval Astronomical Expedition to the Southern Hemisphere during the years 1849, '50, '51, 52," by Lieut. J. M. Gilliss and others (Philadelphia, 1856), especially vol. ii., on "The Andes—Minerals, Animals, Plants, and Fossils;" and "The Andes and the Amazon," by J. Orton (New York, 1870).

ANDLAW, Franz Xaver von, a German diplomatist, born at Freiburg, Baden, Oct. 6, 1799, died Sept. 4, 1876. He served in the foreign office and diplomatic service of Baden, and was for many years ambassador at Vienna, retiring in 1856. He wrote *Erinnerungsblätter aus den Papieren eines Diplomaten* (Frankfort, 1857), and *Mein Tagebuch*, embracing the years 1811–'61 (2 vols., Frankfort, 1862). Among his other principal works is *Die Frauen in der Geschichte* (2 vols., Mentz, 1861).

ANDOCIDES, an Athenian orator, born in 467 B. C. Accused in 415 of aiding Alcibiades in profaning the mysteries and mutilating the Hermæ, he was banished after revealing the names of four of the guilty parties, who were then executed. On the establishment in 411 of the government of the 400, he returned to Athens, but was imprisoned on a charge of rendering some service to their democratical opponents at Samos. Escaping soon after, he fled to Cyprus, where he remained till another revolution at Athens encouraged him to go thither once more to solicit the restoration of his rights. He was unsuccessful, and had to retire a third time into banishment. On the overthrow of the tyranny of the thirty in 403 he was, however, permitted to return, and for several years he enjoyed much of his former consideration and influence; but having been convicted of illegal conduct during an embassy to Sparta, he was a fourth time driven into exile, where he died at an advanced age. There are three orations of Andocides extant in defence of himself, besides one against Alcibiades, which is, however, considered spurious. His style is simple and unadorned. The best edition of these orations is that of Baiter and Sauppe (Zürich, 1838).

ANDORRA, a small republic situated between the French town of Foix, in the department of Ariége, and the Spanish town of Urgel, in the province of Lerida, in valleys shut in on all sides by the Pyrenees, excepting on the south along the Balira and its affluents; area, 200 sq. m.; pop. estimated at about 12,000. It is divided into 6 communes. The capital, of the same name, is in lat. 42° 30′ N., lon. 1° 30′ E., 30 m. S. of Foix and 12 m. N. of Urgel; pop. about 800. The other principal places are Ordino, San Julian, Encam, Canillo, Masana, and the beautifully situated springs of Escaldas, which French speculators have sought to convert into a fashionable watering and gambling place. The chief products are tobacco, grapes, and timber. Game abounds. Cereals are imported from France. There is some traffic in wood, iron, and wool, but the principal occupation is cattle raising.—The Andorrans, having assisted Charlemagne against the Moors, were rewarded with the privilege of self-government, the emperor only reserving to his crown some feudal claims, which were ceded in 819 by Louis le Débonnaire to the bishop of Urgel. The counts of Foix and subsequently Henry IV. reasserted these claims, but they were relinquished during the French revolution, and partly restored in 1806 at the request of the people of Andorra. The republic continues to maintain its independence under the suzerainty of France and the authority of the bishop of Urgel. The executive power is held by the president or first syndic of the general council, assisted by a second syndic, both elected for four years by its 24 members, who are themselves elected for the same term by four heads of families of each commune. Justice is administered by two viguiers or primary magistrates, respectively appointed by the French government and by the bishop of Urgel, who also alternately name a civil magistrate. The republic pays a biennial tribute of 960 francs to France and one of 891 francs in the intervening years to the bishop of Urgel. The Andorrans are a fine, vigorous race, who boast of their poverty as preserving their freedom, and are very proud of their ancient institutions. Every man from 16 to 60 is trained as a soldier. They are illiterate, and so incommunicative that in Catalonia to assume ignorance is called to play the Andorran. They are, however, kindly and hospitable, marry chiefly among themselves, and the principal families are all related to each other. They speak a Catalonian dialect. The bishop of Urgel is the sole dispenser of ecclesiastical patronage for four months, his appointments being subject to papal ratification during the rest of the year.—

See Baquer's *Historia de la república de Andorra* (Barcelona, 1849); Ziegler's *Reise in Spanien* (Leipsic, 1852); and Bayard Taylor's "By-Ways of Europe" (New York, 1869).

ANDOVER, a market town of Hampshire, England, 20 m. N. of Southampton; pop. in 1871, 5,501. Its name is derived from the Anglo-Saxon Andeafaran (ferry over the river Ande). Andover has a large malt trade and an extensive traffic in timber with Portsmouth. The fair which is annually held at Weyhill near Andover was formerly one of the most celebrated in Europe.

ANDOVER, a town of Essex county, Mass., on the Merrimack and Shawsheen rivers, 21 m. N. of Boston; pop. in 1870, 4,873. The village is pleasantly situated in an elevated and healthy district, and has railroad connection with Boston, Lawrence, Lowell, Salem, and Newburyport. The chief importance of the town is derived from its literary institutions. It is the seat of Phillips academy, founded in 1780 by the munificence of John and Samuel Phillips, who were sons of a clergyman of Andover and graduates of Harvard college. The former was prominent in the politics of New Hampshire, and the latter was a state councillor of Massachusetts. Its funds are large, and it has a complete chemical and philosophical apparatus, and libraries containing 2,500 volumes. There are 8 instructors, and 154 students in the classical and 74 in the English department. The Andover theological seminary, an offshoot of Phillips academy and under the same trustees, was founded in 1807, with the object of "providing for the church a learned, orthodox, and pious ministry." Its early donors were Samuel Abbot, a merchant of Boston, Moses Brown and William Bartlett, merchants of Newburyport, and John and Phœbe Phillips of Andover. The whole amount it has received is not less than $400,000. It is under the control of the Congregationalists, but is open to Protestants of all denominations. It has 5 professors, generally more than 100 students, and a library of 30,000 volumes. In 1870 the number of graduates was 1,618. Its course of studies occupies three years. Tuition and room rent are free to all, and additional aid is given to a portion of the students. The "Bibliotheca Sacra," a leading organ of New England theology, edited by the professors, is published as a quarterly at Andover. The Abbot female academy, established here in 1829, is a flourishing institution, designed especially for the education of female teachers. The buildings of these institutions are of brick, and stand near together on an eminence commanding a fine prospect. There are generally from 400 to 500 students in all the institutions. Andover contains also a bank and 8 churches, 5 of which are Congregational, 1 Episcopal, 1 Methodist, and 1 Baptist. In 1865 there were 4 factories for the manufacture of tow and flax, employing 100 males and 150 females; 5 woollen mills, with 24 sets of machinery, employing 212 males and 188 females; a file factory with 350 hands; and an establishment for the manufacture of steel, employing 100 hands.

ANDRADA, Antonio d', a Portuguese missionary, born about 1580, died in Goa, Aug. 20, 1633. He entered the society of Jesus at Coimbra in 1596, joined the East Indian mission, arrived at Goa in 1600, and was appointed superior of one of the houses of the society. Hearing that vestiges of Christianity existed in Thibet, he set out, disguised as a Mongolian, to visit that country in 1601, and reached Caparanga, the military capital, where it is said he built a church in honor of the Virgin. He made a second journey to Thibet in 1625–'6, and was again most favorably received. Returning to the Portuguese settlement, he was appointed provincial of Goa and deputy of the inquisition. His *Novo descobrimento do Grão Catayo, ou dos Reynos de Tibet* (Lisbon, 1626), was translated into Italian, and from that language into French (new ed., 1795).

ANDRADA E SYLVA, Bonifacio Jozé d', a Brazilian statesman and naturalist, born in Santos, June 13, 1765, died near Rio de Janeiro, April 6, 1838. Under the patronage of the Lisbon royal academy he was enabled to travel in Europe, studying in Paris under Lavoisier, at the mining school of Freiberg under Werner, and at Pavia under Volta. In 1800 he became professor of metallurgy and geognosy at Coimbra, and soon afterward general intendant of the Portuguese mines. He took an active part in the construction of canals and public works, and in 1812 he was named perpetual secretary of the Lisbon academy of sciences. He returned to Brazil in 1819, and became one of the champions of national independence. As vice president of the provincial junta (Dec. 24, 1821) he urged Dom Pedro I. to remain in Brazil, became his minister of the interior (Jan. 16, 1822), was removed from his office Oct. 25, but reinstated Oct. 30, at the request of the people, and was finally displaced July 17, 1823, on account of his liberalism. In the constituent assembly his opposition became so bitter that after its dissolution (Nov. 12, 1823) he was arrested and banished to France, and lived in Bordeaux till 1829, when he was permitted to return to Brazil. Dom Pedro I. abdicating April 7, 1831, in favor of Dom Pedro II., selected Andrada as the latter's guardian and tutor. In 1833 he was tried on a charge of intriguing for the restoration of Dom Pedro I. Although acquitted, he was deprived of his position and restrained of his liberty. He wrote on mineralogy, and is the author of *Poesias d'America Elysea* (Bordeaux, 1825).—His brothers, ANTONIO CARLO and MARTIM FRANCISCO D'ANDRADA, were associated with Brazilian politics and shared his fate. The latter (born in Santos in 1776, died there Feb. 23, 1844) left two sons: JOZÉ BONIFACIO, author of *Rosas e goivos* (São Paulo, 1849); and MARTIM FRANCISCO, author of *Lagrimas e sorrisos* (Rio, 1847), and of the drama *Januario Garcia* (1849).

ANDRAL, Gabriel, a French physician, born in Paris, Nov. 6, 1797, died Feb. 13, 1876. His father, Guillaume, was a member of the academy and chief physician to the French army in Italy and to Murat, and afterward to Louis XVIII. Through the influence of his father-in-law, Royer-Collard, and also by his fame as the author of the *Clinique médicale* (4 vols. 8vo, 1824–'6), he was appointed in 1827 professor of hygiene in the faculty of Paris, and in 1830 was promoted to the chair of internal pathology. In 1839 he succeeded Broussais as professor of pathology and general therapeutics. With Gavarret and Delafond he published researches *Sur les modifications de proportion de quelques principes du sang.* His *Précis d'anatomie pathologique* (3 vols., Paris, 1829), *Cours de pathologie interne* (3 vols., 1836), and *Essai d'hématologie pathologique* (1843) have been translated into foreign languages.

ANDRÁSSY, Gyula (Julius), count, a Hungarian statesman, born in the county of Zemplén, March 8, 1823. His ancestors were known from the 11th century in Bosnia, and from the 16th in Hungary, where they acquired vast estates with the rank of count. The Italian branch of the same stock, the margraves d'Andrássy and chevaliers de Rivalto, have been extinct since 1793. The head of the senior Hungarian branch, Count Charles, the father of Count Julius (born in Gömör in 1792, died in Brussels in 1845), was an opposition member of the diets of 1839–'40 and 1843–'4, and wrote in German "Outlines of a Possible Reform in Hungary." Count Julius was a member of the Presburg diet of 1847–'8, lord lieutenant of the county of Zemplén, led the militia against the Austrians, went as Hungarian ambassador to Constantinople, and from 1849 to 1857 was an exile in France and England. He was a member of the diet of 1861, vice president of the diet of 1865–'6, and chairman of the committee on "the common relations of the Austrian empire." After the accession of the Beust ministry, Oct. 30, 1866, and the recognition of Hungarian sovereignty under a dual Austro-Hungarian empire, Count Andrássy was, at Deák's demand, appointed Hungarian prime minister of the empire, Feb. 17, 1867. He also acted as minister for the national defence, popularized his administration by selecting several of its members from outside the ranks of the aristocracy, carried out the measures broached by the committee of 1865–'6, under the guidance of Deák, in support of the sovereign rights of Hungary, and instituted various financial, military, and judicial reforms. Sympathizing with France during the Franco-German war, he yet insisted upon neutrality. He approved the overthrow of the papal temporal power, and was rather antagonistic to Russia in the eastern question, until he succeeded Count Beust (Nov. 9, 1871) as foreign minister of the Austro-Hungarian empire, when he seemed disposed to eschew all external complications, and bent on the preservation of peace.

ANDRÉ, Johann Anton, a German composer, born at Offenbach, near Frankfort-on-the-Main, Oct. 6, 1775, died there, April 5, 1842. His father was Johann André, founder of the celebrated musical establishment, which still continues to prosper at Offenbach, and which under his son's direction attained a high degree of celebrity, especially by his purchase of the compositions left by Mozart. His own compositions comprised over 100 pieces of all sorts of music, and at the time of their publication were popular in southern Germany, although they are at present almost forgotten. He wrote a *Lehrbuch der Tonkunst* (Offenbach, 2 vols., 1832–'43, the last part by his pupil Heinrich Henkel), and published Mozart's diary, and some original pieces of that composer.

ANDRÉ, John, a British officer, born in London in 1751, executed at Tappan, Rockland co., N. Y., Oct. 2, 1780. At 18 years of age he embarked in a mercantile career, but being disappointed in a love affair he entered the army, and in the autumn of 1775 was taken prisoner by Gen. Montgomery in Canada. He afterward became aide-de-camp successively to Gen. Grey and Sir Henry Clinton, the latter of whom in 1779 caused him to be promoted to the rank of major, and appointed adjutant general of the British army in North America. In this capacity he soon became engaged in a secret correspondence with Gen. Benedict Arnold of the continental army, the object of which was the betrayal of the American cause to the British commander-in-chief. Early in August, 1780, Arnold assumed command of West Point on the Hudson river, then the strongest and most important post in the United States, and considered the key of communication between the eastern and southern states. In furtherance of his treasonable designs he proposed to Clinton, whose headquarters were then in New York, to deliver this fortress into his hands, and with a view of perfecting arrangements for that purpose demanded a personal interview with André. The latter accordingly repaired on Sept. 20 to Dobbs Ferry, on the Hudson, and failing to meet Arnold there, went on board the British sloop-of-war Vulture, which was anchored in the river near that place. On the night of the 21st he went ashore at a point about 6 m. S. of Stony Point and had an interview with Arnold, which was prolonged into the morning of the 22d. On departing for West Point Arnold gave him a passport, authorizing John Anderson (the name assumed by André) to pass the American lines to White Plains or below, if he chose; and also six papers in his own handwriting which would enable the British general to direct his attacks against West Point with almost absolute certainty of success. These, at Arnold's suggestion, André concealed between the soles of his feet and his stockings. André had fully expected to return to New York on board the Vulture; but finding this impossible, he reluctantly crossed the river to Verplanck's

Point, accompanied by one Joshua Smith, at whose house the interview with Arnold had taken place, and prepared to journey on horseback to New York. Previous to this he had, contrary to the positive instructions of Clinton, exchanged his uniform of a British officer for a disguise. He passed the night of the 22d with Smith at a place called Miller's, and early on the succeeding morning was again in the saddle. Near Pine's bridge Smith left him, and he proceeded on his way alone, taking the Tarrytown road through what was then known as the "neutral ground," a region devastated by marauding parties from both armies. Between 11 and 12 o'clock, when within half a mile of Tarrytown, he was challenged by three men, John Paulding, David Williams, and Isaac Van Wart, to whom he incautiously replied that he belonged to the "lower" or British party. His captors, who were Americans, immediately searched his person and discovered the treasonable papers. Rejecting his offers of pecuniary reward, they conveyed him to the nearest military station at North Castle. He was thence taken to Tappan, the headquarters of the American army, and tried as a spy before a board of officers consisting of six major generals and eight brigadiers, by whom he was found guilty and sentenced to death. Every effort was made by Clinton to save him, and every fair opportunity allowed by Washington, but his offence under military law was unpardonable. His request that he might be shot could not under the circumstances be granted, and he was hanged as a spy, in the full uniform of a British officer, and in the presence of a large detachment of troops and an immense concourse of people, whom he bade witness that he died like a brave man. During the brief period of his captivity he endeared himself to all who came in contact with him by his sweetness of disposition and the charm of his conversation and manners. His fate was lamented not less sincerely by American officers than by his own countrymen. Its justice, notwithstanding the exasperation which it originally provoked in England, is now generally conceded. In 1821 André's remains were removed to England, and are now interred in Westminster Abbey beneath a costly monument of marble.

ANDREA, Girolamo d', a Roman cardinal, born in Naples, April 12, 1812, died in Rome, May 15, 1868. He was a member of an old patrician family, and was intrusted by Pius IX. with important diplomatic and ecclesiastical functions. For some time he displayed great zeal in behalf of the papal government, and was made cardinal in 1852. Subsequently he became hostile to the Roman see and showed a leaning toward the party of Italian unity. He was at first treated with forbearance, but in 1865 an investigation was ordered into his conduct, and he was removed from his bishopric of Sabina, and in 1867 ordered to leave Naples, where he was then residing, and present himself at Rome. After some hesitation he obeyed, and was subjected to certain ecclesiastical penalties, without being permanently deprived of his dignities. He did not long survive his disgrace, and died very suddenly.

ANDREA PISANO, an Italian sculptor and architect, born in Pisa in 1270, died in Florence in 1345. He was one of the first to depart from the Gothic style in art. After having been employed at the cathedral of Pisa, in the execution of the bronzes at Perugia, and of some small figures in marble for Santa Maria al Ponte at Pisa, he was invited to assist in completing the façade of the cathedral of Santa Maria del Fiore of Florence. He also executed a marble statue of Boniface VIII., and statues of St. Peter and St. Paul, for the same church, which were much admired. After having spent some time at Venice, where he made several small statues for the front of St. Mark's, he returned to Florence, and after the death of Arnolfo di Lapo was placed in charge of all the public works. He executed the bronze relievi for the gates of the baptistery, which gained for him great fame and the honorary citizenship of the republic. The subject is the life of St. John, and the incidents are represented in 22 compartments. He designed the castle of Scarperia, the arsenal of Venice, and the church of San Giovanni at Pistoia. By order of the adventurer called the duke of Athens, who in 1342 made himself by a *coup-d'état* master of Florence, he fortified and enlarged the ducal palace, ornamented the city wall with towers and magnificent gates, and designed a small citadel.

ANDREA DEL SARTO. See SARTO.

ANDREÆ. I. Jakob, a German theologian, born at Waiblingen in Würtemberg, March 25, 1528, died June 7, 1590. He studied at Stuttgart and Tübingen, and was ordained a pastor in the former town in 1549. In 1557 he became preacher to the court of Duke Christopher of Würtemberg, whom he accompanied to the diets of Ratisbon and Frankfort. In 1562 he was appointed professor of theology and chancellor of the university at Tübingen, and provost of the church of St. George, and from this time took an important part in the movements and discussions of the Protestant church. He was particularly influential in securing the adoption of the *Formula Concordiæ* as the common profession of faith of the two Protestant parties. **II. Johann Valentin**, a voluminous German author, grandson of the preceding, born at Herrenberg, Aug. 17, 1586, died in Stuttgart, June 27, 1654. After travelling over Germany, Switzerland, Italy, and France, he filled various ecclesiastical positions, and for some time officiated at the chapel of the duke of Würtemberg. His *Mythologia Christiana* and some of his other Latin works, have been partly translated into German by Herder and Sonntag; and his *Civis Christianus, sive Peregrini quondam errantis Restitutiones* (Strasburg, 1619), was translated into French under the title of

Le sage Citoyen (Geneva, 1622). He published in 1633 a work advocating republican Christianity in Germany. His German writings include several poems; among others, *Christlich Gemâl* (Tübingen, 1612), which is highly praised by Herder, who declares that Andreæ boldly announced truths in the 17th century which no one would dare to express in the 18th. He first made known the order of Rosicrucians in two or three publications, and is regarded by some as its founder or inventor; but this is denied by Herder. (See Rosicrucians.) His autobiography, in Latin, was published at Berlin in 1849.

ANDREÆ, Laurentius, or **Lars Andersson,** a Swedish scholar, born in 1482, died at Strengnäs, April 29, 1552. He studied in Rome, and upon his return to Sweden was appointed archdeacon of the cathedral at Upsal. Gustavus Vasa made him his chancellor, and requested him to undertake the translation of the New Testament. In 1540 he was accused of having concealed his knowledge of a conspiracy against the life of the king, and was condemned to death, but finally escaped by the payment of heavy fines. From that time he lived retired in Strengnäs. His translation of the New Testament, which was the first version in Swedish, was published in folio in 1526.

ANDREANI, Andrea, an Italian painter and engraver, surnamed Il Mantuano, born in Mantua about 1540, died in Rome in 1623. He devoted himself principally to wood engraving, and exerted a marked influence upon the development of that branch of art. His cuts are printed in chiaroscuro, and his works have often been confounded with those of Altdorfer, from his using a similar monogram. Two of his best prints are after Titian's "Deluge" and "Pharaoh's Host destroyed in the Red sea."

ANDREANOV ISLANDS. See Aleutian Islands.

ANDREE, Karl Theodor, a German geographer, born in Brunswick, Oct. 20, 1808, died Aug. 20, 1875. His studies at Jena were interrupted by his trial (1838) for revolutionary proceedings, and being acquitted, he thenceforward connected himself with journalism. From 1861 he edited the *Globus*, a geographical and ethnographical publication at Hildburghausen. His works, chiefly relating to the American continent, include, besides his copious contributions to the Brunswick periodical *Westland* (5 vols., 1851–'8), *Nordamerika in geographischen und geschichtlichen Umrissen* (2d ed., Brunswick, 1854); *Buenos Ayres und die Argentinische Republik* (Leipsic, 1856); *Geographische Wanderungen* (2 vols., Dresden, 1859); and *Abessinien* (1871). He was also the author of *Forschungsreisen in Arabien und Ostafrika* (2 vols., Leipsic, 1860–'61), and of *Geographie des Welthandels* (vol. i., Stuttgart, 1863).

ANDREINI. I. Francesco, an Italian comedian of the 16th and 17th centuries, chief of the celebrated troupe called *I Gelosi*. He published *Le bravure del capitan Spavento* (Venice, 1609), *Ragionamenti fantastici* (1612), and two theatrical pieces in verse (1611). **II. Isabella,** wife of the preceding, a comic actress and an author, born in Padua in 1562, died in Lyons in 1604. She acquired great fame not only by her acting both in Italy and France, but by her varied accomplishments and learning, and her irreproachable character. Medals were struck in her honor with the legend, *Æterna fama*. Her writings both in prose and verse are numerous, nearly all relating to love. **III. Giovanni Battista,** son of the preceding, a comedian and poet, born in Florence in 1578, died in Paris about 1650. Besides three long and several shorter poems, he was the author of 18 dramas, from one of which, a "sacred representation" entitled *Adamo*, Milton has been supposed to have borrowed the plot of "Paradise Lost." There is, however, little resemblance between the two works.

ANDRÉOSSI, Antoine François, count d', a French general and savant, born at Castelnaudary, March 6, 1761, died at Montauban, Sept. 10, 1828. He entered the artillery at an early age, and served under Bonaparte in Italy and in Egypt, where he took an active part in the work of the scientific commission. He was one of the few selected by Bonaparte to accompany him on his return to France, aided him powerfully in seizing the government, and was made inspector general of artillery and engineering. After the treaty of Amiens he was ambassador to London in 1809, governor of Vienna, and afterward ambassador to Constantinople till the restoration. He again engaged in politics during the Hundred Days (1815), was one of the commissioners to treat with the foreign armies after the battle of Waterloo, and thenceforth devoted himself to scientific pursuits. He made important contributions to the *Mémoires sur l'Égypte.*

ANDRÉS, Juan, a Spanish scholar, born of a noble family at Planes in Valencia, Feb. 15, 1740, died in Rome, Jan. 17, 1817. He early entered the society of the Jesuits, and on their expulsion from Spain in 1767 was removed with his companions first to Corsica, and then to Ferrara, where he taught philosophy; but the Jesuit college there was soon suppressed by the pope, and he afterward resided chiefly at Mantua and Parma. In 1776 he published in Italian *Saggio della filosofia di Galileo*, expounding with fairness the system of that philosopher. His principal work is *Dell' origine, de' progressi e dello stato attuale d'ogni letteratura* (7 vols. 4to, Parma, 1782–'99; 4th ed., 23 vols. 8vo, Pisa, 1821). He became blind in 1815 and retired to Rome, but continued his scientific and literary pursuits till his death.

ANDREW, a N. W. county of Missouri, separated from Kansas by the Missouri river, and intersected by the Platte and several other streams; area, 425 sq. m.; pop. in 1870, 15,137, of whom 401 were colored. It has railroad communication with St. Joseph. The soil is fertile, and well adapted to grain, tobacco, hemp, and pasturage. In 1870 the county produced 107,325 bushels of wheat, 1,086,375 of corn, 178,332 of oats, 102,967 of potatoes, 187,663 lbs. of butter, 31,825 of wool, and 5,941 of tobacco; value of animals slaughtered, $463,582. Capital, Savannah.

ANDREW, the name of three Hungarian kings of the family of Árpád, the founder of the Magyar monarchy.—**Andrew I.**, a cousin of St. Stephen, who introduced Christianity among his subjects, and successor of Aba Samuel. In 1046, in order to win partisans to his claims to the crown, he allowed a persecution of the Christians. He warred more or less successfully against Henry III., emperor of Germany, against his own brother Bela, supported by Boleslas II., king of Poland, was defeated by the Poles and the Hungarian malcontents, and died soon after, in 1061.—**Andrew II.**, called the Hierosolymitan, ascended the throne in 1205, in a civil war against his own nephew, Ladislas III., and died after a checkered reign of 30 years. (See HUNGARY.)—His third wife was Beatrice d'Este, who returned to Italy, and gave birth there to a posthumous son named Stephen, who married a rich Venetian lady, Tomasina Morosini, the mother of **Andrew III.**, called the Venetian. He succeeded Ladislas IV. in 1290, and was obliged to defend his crown against the pretensions of Pope Nicholas IV. and the emperor Rudolph of Hapsburg, both of whom claimed it as their special fief, as well as against Charles Martel, the son of the king of Naples, who was by his mother a descendant of the house of Árpád. Andrew was victorious, but the dissatisfied magnates raised up a new pretender in the person of Charles Robert, son of Martel; and Andrew died in 1301, disgusted and mortified by the rebellion. With him the lineage of Árpád ended.

ANDREW, Saint, one of the twelve apostles, born at Bethsaida. The name of his father was Jonas. He was a disciple of John the Baptist, and the first called of the disciples of Jesus Christ, to whom he brought his brother Simon, afterward called Peter, and is hence called by some of the fathers "the rock before the rock." Of his apostolic labors nothing is said in the Acts of the Apostles. According to Origen, he preached in Scythia. St. Jerome says that he preached also in Achaia, and other ancient writers say also in Sogdiana, Colchis, Argos, and Epirus. He is the principal patron of Scotland. Tradition reports that he was crucified at Patræ, now Patras, in Achaia, on a cross of this form, × (*crux decussata*), hence called St. Andrew's cross.

ANDREW, James Osgood, D. D., an American clergyman, one of the bishops of the Methodist Episcopal church South, born in Wilkes county, Ga., May 3, 1794, died in Mobile, Ala., March 2, 1871. At the age of 18 he was licensed to preach, and in December, 1812, he was received into the South Carolina conference. At the general conference of 1832 he was elected bishop of the Methodist Episcopal church. His second wife being the owner of slaves, the northern delegates to the general conference of 1844 judged that "this would greatly embarrass the exercise of his office as an itinerant general superintendent, if not in some places entirely prevent it." Accordingly, the majority of the body resolved "that it is the sense of this general conference that he should desist from the exercise of this office so long as this impediment remains." The southern delegates, considering this a virtual suspension from the episcopal office, and therefore extra-judicial and unconstitutional, entered their protest. The result was an amicable division of the church into two independent jurisdictions, with an equitable apportionment of the church property. The southern division, under the name of the Methodist Episcopal church South, held a general conference at Petersburg, Va., in May, 1846, at which time Bishop Soule, senior bishop of the M. E. church, and Bishop Andrew gave in their adherence to the church South. Bishop Andrew continued to exercise his episcopal functions till 1868, when he retired from active duty on account of age. His volumes of "Miscellanies" and on "Family Government" have been widely circulated.

ANDREW, John Albion, 21st governor of Massachusetts since the adoption of the constitution of 1780, born in Windham, Me., May 31, 1818, died in Boston, Mass., Oct. 30, 1867. He graduated at Bowdoin college, Me., in 1837, and immediately afterward commenced the study of law in Boston, where in 1840 he was admitted to the bar. During the next 20 years he practised his profession in that city, his most conspicuous efforts being called forth by causes arising under the fugitive slave law of 1850; and in 1858, having during the previous ten years been closely identified with the anti-slavery party of Massachusetts, he was elected a member of the state legislature from Boston. In 1860 he was a member of the republican convention which nominated Mr. Lincoln for the presidency, and in the same year was elected governor of Massachusetts by the largest popular vote ever cast for any candidate. Anticipating the conflict between the government and the seceding states, he early took measures to place the militia of Massachusetts on a footing of efficiency; and within a week after the president's proclamation of April 15, 1861, he despatched five regiments of infantry, a battalion of riflemen, and a battery of artillery to the assistance of the government. He subsequently took an active part in raising and equipping the Massachusetts contingent of three years' volunteers. He was reëlected governor of Massachusetts in 1861, and made frequent visits to Washington and other places to confer with public men on national affairs. He took part in the conference held by the governors of the loyal states at Altoona, Penn., in September, 1862, and prepared the address which they subsequently presented to the president. He presided at the first national Unitarian convention in 1865. He retired from the office of governor in January, 1866, having positively declined a fifth reëlection, and resumed the practice of the law. He afterward also declined an offer of the presidency of Antioch college, Ohio.

ANDREWS, James Pettit, an English historian, born near Newbury, Berkshire, in 1737, died in London, Aug. 6, 1797. His most important work (which he did not live to complete) was his "History of Great Britain, connected with the Chronology of Europe." The part published commences with Cæsar's invasion and ends with the accession of Edward VI. The plan of the work is peculiar, a portion of the history of England occupying one page, while the synchronous portion of the history of Europe is placed on the page opposite. He also wrote a continuation of Henry's "History of Britain" to the accession of James I. (1796), and an amusing collection of "Anecdotes" (1789).

ANDREWS, Lancelot, an English scholar and prelate, born in London in 1555, died in Winchester house, Sept. 25, 1626. He was a favorite of James I., who made him his lord almoner, and successively bishop of Chichester, Ely, and Winchester, and a privy councillor; and he was one of the authors of King James's translation of the Scriptures. His *Tortura Torti*, a large 4to volume (1609), was an answer to Bellarmine's attack upon James's "Defence of the Right of Kings." His other principal works are his "XCVI Sermons," "Lectures on the Ten Commandments," and "Posthumous and Orphan Lectures," all published after his death. His *Praces Privata* (1674) is a collection of passages from the Bible and the fathers in Greek and Latin, still much used in the English translation ("Manual of Private Devotions and Meditations for Every Day in the Year"). His style, though much admired in his own day, is quaint, affected, and overloaded with imagery. He had high notions of ecclesiastical authority, which brought him into conflict with the puritans. He was generally esteemed, however, as a pious, charitable, upright, and munificent prelate.

ANDRIA, a town of S. Italy, in the Neapolitan province of Bari, situated in a fine plain, 32 m. W. N. W. of Bari; pop. in 1871, 34,084. It has a royal college, a small Gothic palace, and a superb cathedral. The favorite hunting seat of Frederick II., Castel del Monte, about 12 m. from the town, is still an imposing structure. In 1799 Andria was nearly destroyed by the bombardment of the French, after a gallant defence.

ANDRIEUX, François Guillaume Jean Stanislas, a French author, born in Strasburg, May 6, 1759, died in Paris, May 10, 1833. He studied law, and distinguished himself as the advocate of the Abbé Mulot in the affair of the diamond necklace. He welcomed the revolution with enthusiasm, but on the fall of the Girondists was obliged to hide himself. On May 23, 1794, he returned to Paris and began to study English literature, and several of his pieces from this time show traces of his familiarity with Swift, Addison, and Steele. In 1795 he was made judge of the court of cassation, was admitted into the newly organized national institute, and was awarded a pension of 2,000 francs by the convention. In April, 1798, he was chosen by the moderate party one of their candidates to the council of 500. After the 18th Brumaire he was appointed by the consulate a member, and afterward secretary and president of the tribunate; but the first consul removed him in September, 1802. After having declined the office of censor, offered to him by Fouché, with 8,000 francs salary, he accepted that of librarian to Joseph Bonaparte, with 6,000 francs, a post which he held for ten years. In 1802 he wrote for the théâtre Louvois, of which his friend Picard was the director, *Helvétius, ou la vengeance d'un sage.* After the death of this philosopher, he was one of the habitués of the famous *salon* of Madame Helvétius at Auteuil. In 1814 he was elevated to the professorship of French literature in the college of France. The romantic school of literature was the object of his unsparing attacks. He was one of the founders of the *Décades philosophiques et littéraires* (1794–1807). Among his more remarkable contributions to the French stage are *Les Étourdis*, performed with brilliant success in 1787; *Le trésor* (1804); *Molière avec ses amis* (1804); *La comédienne* (1816); and his tragedy of *Brutus* (1830). His complete works were published in 4 vols., 1817–'23, and in 6 vols., 1828.

ANDRISCUS, or **Pseudo Philip,** a native of Adramyttium, of humble origin, who in 154 B. C. assumed the name of Philip, proclaiming himself the natural son of Perseus, the last king of Macedon, whom he strikingly resembled. He applied for help to Demetrius Soter, brother-in-law of Perseus, who delivered him to the Romans. Escaping from Rome to Thrace, he raised an army, and drove the Romans out of Macedonia and Thessaly (149), but was checked at Thermopylæ and driven back by Scipio Nasica. He soon afterward defeated and slew the Roman prætor Juventius, took the title of king of Macedon, and formed an alliance with Carthage. In 148 he was twice defeated by Q. Cæcilius Metellus (who was hence surnamed Macedonicus), fled to the Thracian king Byzas, was by him delivered to the Romans, and, after gracing the triumph of Metellus at Rome, was executed by order of the senate in 146.

ANDROCLUS, a Roman slave of the early part of the first century, of whom Aulus Gellius says that having fled from the tyranny of his master and been recaptured, he was sentenced to be devoured by wild beasts in the circus; but a lion which had been let loose upon him recognized him as a man who had once relieved it of a thorn in its foot, and immediately began to caress him. The emperor ordered Androclus to be pardoned, and presented with the lion, which he used afterward to lead about Rome.

ANDROIDES. See AUTOMATON.

ANDROMACHE, the daughter of Eëtion, king of Cilician Thebe and wife of Hector, by whom she had a son named Scamandrius or Astyanax. She lost her father and her seven brothers at the capture of Thebe, her husband in the defence of Troy, and her son on the fall of the latter city, when she became the prize of Pyrrhus, the son of Achilles, to whom she bore three sons, Molossus, Pielius, and Pergamus. On the death of Pyrrhus she became the wife of Helenus, brother of Hector and ruler of Chaonia, a part of Epirus, by whom she had a son called Cestrinus.

ANDROMEDA, a mythical princess, daughter of Cepheus the Ethiopian king and Cassiopea. Her mother having boasted that the beauty of her daughter surpassed that of the nereids, the latter prevailed on Neptune to afflict the country with a deluge and a sea monster. The oracle of Ammon promised that if Andromeda was surrendered to the monster, Ethiopia should be released. The princess was chained to a rock by the shore, and rescued by Perseus, who slew the monster and married Andromeda. Phineus, to whom she had previously been promised, attempted during the celebration of the nuptials to slay Perseus and carry off the bride, but was himself killed with all his associates. After her death, Andromeda was translated to the firmament and placed among the stars.

ANDRONICUS, the name of four emperors of Constantinople.—**Andronicus I. Comnenus,** grandson of Alexis I., born in 1110, died Sept. 12, 1185. He distinguished himself by his martial ability, dissolute conduct, and romantic adventures. In his youth he served against the Turks, was for some time a prisoner, and was afterward appointed to the military command of Cilicia. He besieged Mopsuestia, and though his campaign was unsuccessful, he was rewarded by his cousin the emperor Manuel with new honors. He engaged in a treasonable correspondence with the king of Hungary, and was imprisoned twelve years in a tower of the palace. Escaping after two unsuccessful attempts, he reached Kiev in Russia, persuaded the grand duke Yaroslav to form an alliance with Manuel against the Hungarians, and for this was pardoned, but was afterward exiled to a command on the Cilician frontier. At the head of a band of adventurers, he undertook the pilgrimage to Jerusalem, and, after roving lawlessly through Persia and Turkey, at length fixed his residence at Œnoë, a city of Pontus. On the death of Manuel the populace called him to the purple. He put to death the son and widow of Manuel (1183), but was strict in dispensing justice among the people. A popular rising in favor of his kinsman Isaac Angelus put an end to his career, and he was murdered by the populace with slow tortures.—**Andronicus II. Palæologus,** the Elder, born in 1258, died Feb. 13, 1332. He was crowned emperor in his 15th year, and held the title nine years as the colleague, and from 1282 to 1328 as the successor of his father Michael. In his reign Osman, the founder of the Ottoman empire, effected the conquest of Bithynia, and advanced within sight of Constantinople. Andronicus invited for his assistance from the west a multitude of Catalans, who defeated the Turks in two great battles, but were themselves driven out only after great trouble. His own grandson, Andronicus III., compelled him to abdicate in 1328, and shut him up in a monastery, where he died four years afterward.—**Andronicus III. Palæologus,** the Younger, grandson of the preceding, born in 1296, died June 15, 1341. He revolted against his grandfather in 1321, was made his colleague in 1325, but again revolted and deposed him in 1328. He reconquered Chios from the Genoese (1329), and took Epirus from the Albanians (1337). In 1330 the Turks took Nicæa and made it their capital, and Andronicus joined the fruitless alliance of the western powers against them. He was also at war with the Catalans in Greece, and more successfully with the Bulgarians, Kiptchak Tartars, and Servians. His internal administration was moderate and conciliatory. He left the empire and his infant heir John under the guardianship of John Cantacuzenus.—**Andronicus IV. Palæologus,** grandson of the preceding, governed the empire in the absence of his father John VI., afterward conspired with the son of the sultan Murad to murder their fathers, and was captured and partially blinded. Escaping from a long imprisonment by the aid of the Genoese, he brought about a division of the empire between his father and himself, Andronicus making Selymbria his capital. The dates of these events are very uncertain. On the death of John VI. in 1391, Andronicus gave way to his brother Manuel II., and died a monk.

ANDRONICUS. I. Livius, the most ancient of the Latin poets, died about 221 B. C. He was an Italian Greek, whom the fortune of war had thrown into the hands of the Romans, and made the slave of M. Livius Salinator. His master gave him his liberty, and with it his own name of Livius. Andronicus then settled in Rome, acquired a perfect knowledge of the Latin language, and became a voluminous writer of dramatic and other poetry. But few fragments of his works have come down to us, of which the best edition is that of Düntzer (Berlin, 1835). Cicero considered them not worth reading. Horace avows that he would have contemplated their destruction with regret **II.** Of Rhodes, a Peripatetic philosopher who flourished in the middle of the 1st century B. C. He is chiefly celebrated as the editor of Aristotle's works, to which he gave that arrangement which is to a great extent retained in the present editions. He wrote a general work on Aristotle, which contained a complete catalogue of his writings, and commentaries on some of his physical, metaphysical, and logical treatises, all of which have perished.

ANDROS, an island of Greece, in the archipelago, the northernmost of the Cyclades, 21 by 8 m.; pop. in 1870, 19,674. It is mountainous, but has many fertile valleys, yielding wine, oil, silk, oranges, citrons, &c. Andro, or Castro, the capital, is situated on a shallow harbor on the E. coast; pop. 5,000. The Andrians submitted to the Persians in the invasion of Greece by Xerxes, and subsequently, after some resistance, to the Athenians. Still later, the island was successively annexed to Macedon, Pergamus, and Rome.

ANDROS, an island of the Bahamas, giving name to a small group of islands which are but thinly inhabited, and the passages between which are intricate and difficult. The main island, 20 m. W. of New Providence, is of irregular shape, 65 m. long and 45 m. wide. It is chiefly composed of salt-water marshes and fresh-water swamps, in which there are a few elevated oases bearing excellent cedar timber. It has a population of about 800, nearly all colored, a school, and the privilege of sending one member to the Bahamas assembly.

ANDROS, Sir **Edmund**, an English colonial governor, born in London, Dec. 6, 1637, died there, Feb. 24, 1714. He was brought up at court, his father being an officer of the royal household. He was a major in Prince Rupert's dragoons, and in 1674 succeeded his father as bailiff of Guernsey. In the same year he was commissioned governor of New York, and received its surrender by the Dutch after their brief repossession of it. He administered its affairs in the interest of the duke of York, was involved in controversies with the surrounding colonies and with the French in Canada by his extensive claims to jurisdiction, and in 1680 seized the government of East Jersey, deposing Philip Carteret. He was recalled to England in 1681, cleared himself of several charges preferred against him, and retired to Guernsey. New England having been consolidated, Andros was appointed its governor general in 1686, under instructions which, while establishing religious toleration, forbade all printing, and autherized him to appoint and remove his own council, and with their consent to enact laws, levy taxes, and control the militia. Carrying out these instructions in a despotic manner, his government soon became very odious to the colonists. Connecticut having held out against him, he appeared in the council chamber at Hartford with an armed guard in October, 1687, and demanded the surrender of its charter, which is said to have been prevented by its sudden removal and concealment in a hollow tree afterward celebrated as the charter oak. Contemporary documents, however, seem to prove that no such event occurred, that Andros really possessed himself of the original charter, and that a duplicate had been concealed some time previously. (See Brodhead's "History of New York," vol. ii., pp. 472–'3.) In 1688 New York and New Jersey were added to his jurisdiction, and Francis Nicholson was appointed lieutenant governor there. On the news of the revolution in England, the people of Boston imprisoned Andros and several of his officers, April 18, 1689, and the New England colonies restored their former governments, while Jacob Leisler usurped authority in New York. (See LEISLER.) In July he was sent to England by order of King William, with a committee of accusers, but was acquitted without a formal trial. In 1692 he was made governor of Virginia, where he made himself comparatively popular, but was removed in 1698 through the influence of Commissary Blair. In 1704–'6 he was governor of Guernsey. In 1691 Andros published a narrative of his proceedings in New England, which was republished in 1773.

ANDROSCOGGIN, a S. W. county of Maine; area, 400 sq. m.; pop. in 1870, 35,866. It has a fertile soil, and in agriculture ranks among the foremost in the state. The productions in 1870 were 7,800 bushels of wheat, 72,344 of corn, 20,404 of barley, 96,413 of oats, 371,391 of potatoes, 48,605 lbs. of wool, 559,218 of butter, 179,858 of cheese, and 50,787 tons of hay. The county has fine water power at Lewiston, produced by the junction of the Androscoggin and Little Androscoggin rivers, and there are numerous manufacturing establishments. The Portland branch of the Grand Trunk railroad, and the Maine Central and other lines, traverse the county. In 1870 there were 8,182 children attending school. Capital, Auburn.

ANDROSCOGGIN, or **Ameriscoggin**, a river of New Hampshire and Maine. It is formed in Coös county, N. H., near the Maine boundary, by the union of the Margalloway river with the outlet of Umbagog lake, flows S. to the White mountains, and making a sharp bend to the E. about lat. 44° 20′, enters the state of Maine, and joins the Kennebec river at Merry Meeting bay, about 18 m. above the entrance of that river into the ocean. Its length is 157 m., 66 of which are in New Hampshire.

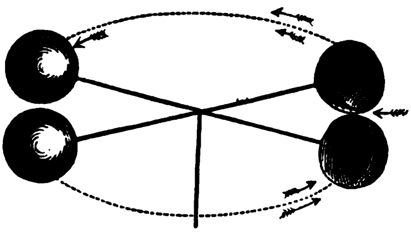
ANDRYANA, Alexandre, a French champion of Italy, born in 1797, died in January, 1863. He was an officer of the French army till 1814, and subsequently joining the Italian revolutionists, he became a fellow prisoner of Silvio Pellico in the fortress of Spielberg, and wrote graphic *Mémoires d'un prisonnier d'état* (2 vols., Paris, 1837–'8; 4th ed., 1862). He took part in the French revolution of 1848, and in 1859 was commissary general to the army of occupation in Lombardy.

ANDUJAR, or **Anduxar**, a town of Spain, in Andalusia, province of Jaen, at the foot of the Sierra Morena, and on the right bank of the Guadalquivir, 50 m. E. N. E. of Córdova; pop. about 13,000. It is a comparatively wealthy and very industrious place, its industry consisting chiefly in *alcarrazas*, a peculiar kind of jars made of red and white clay found in the neighborhood, and highly esteemed for the power of keeping water cool in hot weather. The vicinity furnishes an extraordinary abundance of wheat, barley, oil, wine, and honey. The town contains several monasteries. It is supposed to be near the site of the ancient Illiturgis or Forum Julium. The capitulation of Baylen, so called from the neighboring place of that name, which was the opening of the French disasters in the Peninsular war, was signed in Andujar in July, 1808, after severe fighting around the town.

ANEGADA, a British West Indian island, the northernmost of the Virgin group and of the Lesser Antilles, 18 m. N. of Virgin Gorda; length 10 m., greatest breadth 4½ m. It has but few inhabitants, who produce some cotton and food, and large quantities of salt from salt ponds. There is abundance of fresh water. Numerous shipwrecks occur, especially on a reef extending S. E. and S. from the E. end of the island.

ANEL, Dominique, a French surgeon, born in Toulouse about 1679, died about 1730. He acquired great fame by his invention of the probe and syringe still known by his name, and is also celebrated for his successful treatment of aneurism and fistula lachrymalis, upon which he published treatises. At the beginning of the 18th century he served as surgeon in the Austrian army, and in 1710 established himself at Genoa.

ANEMOMETER (Gr. ἄνεμος, wind, and μέτρον, measure), an instrument for measuring the force of the wind. Attention was first given to this subject by Dr. Croune in 1667, and instruments were contrived by him and by Wolfius and others in the last century. These have all given place, however, to recent inventions of more perfect construction. The first attempts were to measure the force of the wind by its pressure upon a vertical plane, kept in position by a spring or by a weight suspended by a cord wound around a conical spiral axis, which weight the wind would raise more or less according to the degree of pressure on the vertical plane. A bag of air opening into a glass tube which was shaped like the letter U, and contained a fluid which by compression of the bag was forced down one leg and up the other, was another contrivance for the same purpose. Another form of it was to dispense with the bag and turn one extremity of the tube against the wind, expanding it to a funnel shape, so that the wind might blow directly into it and press upon the surface of the fluid. The tube was drawn out to a small diameter in the curve at the bottom, so as to check the sudden fluctuations caused by irregular blasts of wind. By means of this simple instrument, Dr. Lind, who invented it, ascertained the force of the wind at different velocities by the height of the column of water raised by it. A gentle breeze, moving at the rate of nearly four miles an hour, raises a column of water $\frac{1}{40}$ of an inch, which is equivalent to a pressure of 2⅛ ounces upon a square foot. A high wind moving 32⅛ miles per hour raises the column 1 inch, with a pressure of nearly 5¼ pounds on the square foot. A column of 8 inches indicates a pressure of 15⅛ pounds, and a velocity exceeding 56¼ miles an hour. At 9 inches the wind is a violent hurricane moving 97⅛ miles an hour, and exerting a pressure on the square foot of 46⅞ pounds. The atmospheric pressure being a little over 2,000 pounds on the square foot, or equal to a column of water 33 feet high, the greatest force exerted by the wind is feeble in comparison with this.—A more complicated apparatus was invented by Dr. Whewell, and another by Mr. Osler, both of which have been used in England at the meteorological observatories and government institutions. Both are self-registering, and determine the force of the wind by the number of revolutions of a windmill fly, the axis of which by perpetual screws and toothed wheels is connected with the registering pencil. In Whewell's instrument the windmill with its wheels and vane is on a horizontal plate, which revolves on the top of a vertical cylinder. The pencil is attached to a little block of wood or nut, through which passes a screw from the horizontal plate above to a circular rim below the cylinder, all which revolves around the cylinder as the wind changes. A straight rod also goes through the pencil block or nut, up and down which it slides as the screw turns. According as the wind blows gently or strongly, this screw turns slowly or fast, and carries the pencil down the cylinder at a proportional rate. Its point reaches the surface of the cylinder and marks upon it its position, and as the frame turns with the change of direction of the wind, the course of the wind is registered upon the face of the cylinder. For this purpose it is divided by vertical lines into 16 or 32 equal parts corresponding to the points of the compass. This instrument is deficient in not recording the time during which each wind blows, nor the times of its changes, nor its force at any particular moment. It merely gives the order of the changes, and the entire quantity that blows from each point. This is known by the vertical length of the pencil mark in each division of the cylinders corresponding to the courses. It is defective also by the friction of its machinery. Osler's instrument, constructed on similar principles, is more complicated than Whewell's. Its register is divided by lines into spaces, which represent the 24 hours of the day, and in these spaces pencils inscribe lines, one of which indicates the direction, another the pressure of the wind, and a third, connected with a rain gauge, the quantity of rain which has fallen at every hour. The register moves along by clockwork under the pencils, and at the meteorological observatory at Greenwich a new one is employed every day. In the royal exchange in London one of these instruments is in use with a register made to last a week. By the lines inscribed on the register the integral or quantity of the wind can be calculated that has blown to each point of the compass during the periods of the observations; and thence the resultant, or average effect of all the winds.—The instrument now in use in the United States office for weather reports is Robinson's anemometer, which consists of four horizontal arms (see figure) radiating from a central point, at which is a vertical axis of revolution. A hollow hemispherical cup is attached to each arm in such manner that when the wind is pressing upon the concave side of a cup on one arm, the cup on the opposite arm presents its convex side toward the wind. The wind exerts more pressure on the concave side than on the convex, and hence causes the arms to revolve. The rate of revolution per minute gives the velocity of the wind. Each instrument has to be tested by placing it upon a moving body on a calm day. In this way it is easily found what the number of revolutions is which the instrument will give for any velocity; it is then placed upon a high building, and its axis attached to a recording apparatus similar to that described above.—Biram's anemometer is an instrument for measuring and registering the quantities of air which circulate through the passages of mines. It was invented in consequence of the recommendation of a committee appointed by the British house of commons, that the use of such an instrument should be adopted as a precaution against the explosions in coal mines. It is a disk of a foot diameter, made to revolve when placed in a current of air, and furnished with registering wheels like those upon a gas meter. Any want of attention on the part of those having charge of supplying the required current of fresh air is thus readily detected.



ANEMONE (Gr. ἄνεμος, wind, as many species grow in elevated windy places), a genus of plants of the family of *ranunculaceæ*, Jussieu. The leaves of the stem are generally ternate, forming an involucre which is more or less distant from the flower; the calyx corolla-like, with from 5 to 15 colored petals, longer than the stamens; carpels numerous, ending in persistent styles. About 60 species are cultivated on account of their beauty, succeeding best in light loamy soils. They are propagated by division, offsets, and seeds; the greenhouse species from cuttings in light loam under glass. The colors of the flowers predominate in the following order one over the other: white, yellow, blue, reddish white, purple, red, striped, whitish, creamy violet. Their recommendations for a place in the garden are: a fine dense foliage of beautiful green color; involucre green, and distant about ⅛ from the flower; stem straight, light; flowers globose, petals large, rounded, with an unguis (nail) of different color. The native countries of the species are, in order of prevalence, Europe, especially the south, North America, Siberia, the rest of Asia, South America, South Africa. The most valued are: The *A. hortensis* and *stellata*, often flowering the second year, easily doubled by culture; flowering from mid-April to the end of May. *A. pavonina*, of Europe; root tuberous; flowers purple; attains a foot in height; a variety is crimson with green centre. *A. ranunculoides*, of Europe, about 6 inches high. *A. apennina;* leaves biternate; many narrow, blue petals. *A. narcissifolia*, of Switzerland; 10 inches; umbellated purplish and yellow. *A. vitifolia*, of Nepaul, *japonica*, and *elegans* (also from Japan), recommend themselves by their strong and tall frame (1½ to 3 feet), and by the beauty of their flowers. *A. capensis* or *arborea;* stem woody, though but 7 inches high; flowers reddish outside, white inside. *A. pulsatilla*, common in Europe; 10 inches high; flowers large violet; foliage hairy. *A. coronaria*, of Asia Minor; hard to be raised from seed in this country.—A new genus has been separated from the anemone, under the name of *hepatica*, to which belongs the beautiful species commonly called anemone that adorns our forests in early spring; leaves leathery, dark green on the upper side, liver-brown on the lower; flowers numerous, of all shades of white and bluish purple. Both are allied to the clematids, hellebores, actæas, and crowfoots, with which they form the 41 genera of *ranunculaceæ*. The hepatica was employed of old in liver complaints, from the belief in its sympathy with

Anemone Hortensis.

that organ. Pulsatilla is a much used remedy in the homœopathic materia medica.

ANEMOSCOPE (Gr. ἄνεμος, wind, and σκοπεῖν, to look), a wind indicator, or weathercock. The term is, however, only applied when the weathercock is attached to a spindle which passes from the vane into an apartment below, and there by an index upon a compass dial indicates in what direction the wind blows. For expressing this direction the plan has been adopted of dividing the great circle of the horizon into 32 parts of 11° 15′ each, and calling the directions of the wind successively: N., N. by E., N. N. E., N. E. by N., N. E., N. E. by E., E. N. E., E. by N., E., E. by S., E. S. E., S. E. by E., S. E., S. E. by S., S. S. E., S. by E., S., S. by W., S. S. W., S. W. by S., S. W., S. W. by W., W. S. W., W. by S., W., W. by N., W. N. W., N. W. by W., N. W., N. W. by N., N. N. W., N. by W., N. The latest improvement of the anemoscope is to attach a recording clockwork to the dial plate, so that not only the direction of the wind, but the time that it blows in any direction, is permanently recorded. Such an arrangement is now in operation at the meteorological observatory in the Central Park, New York.

ANERIO. I. Felice, an Italian musician, born in Rome about 1560, died about 1630. In 1594 he succeeded Palestrina as composer of the pontifical chapel. A great number of his compositions have been published, and his unpublished pieces have been preserved in the archives of the basilica of the Vatican and in the pontifical chapel. **II. Giovanni Francesco**, brother of the preceding, born in Rome about 1567, was for many years chapel master of the king of Poland and of the cathedral of Verona, and subsequently a teacher of music at the Roman seminary. He was one of the first Italian composers who made use of quavers, semi-quavers, and demi-semi-quavers. Many of his musical compositions have been published.

ANEROID. See BAROMETER.

ANEURIN, a Welsh bard, who was the leader of the mediæval Britons in the battle of Cattraeth, and who celebrated in heroic verse the deeds of that day. His work is still preserved in the literature of Wales. He died about 570. It is supposed that this poet was either identical with or the brother of the historian Gildas.

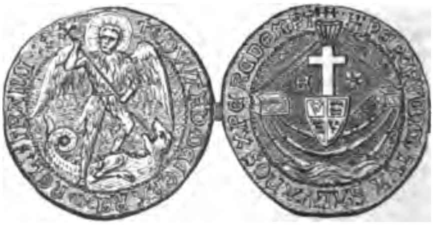
ANEURISM (Gr. ἀνευρυσμός, a widening or extension), a term used in surgery to signify a vascular tumor or enlargement, arising from the morbid distention of an artery It is much more common in some arteries than others, but any artery of the body is liable to it. The corresponding disease and enlargement of a vein is termed varix. An artery is composed of three coats or membranes which form the walls of a strong, elastic, and distensible tube. In a healthy state, the tube maintains a certain diameter under the ordinary impulse of the blood; but when the walls of an artery become diseased, they yield before the constant pressure of the circulating fluid, causing the diseased part to form a bag or tumor. This bag enlarges as the diseased walls distend; and the inner and middle coats, being less resisting than the outer, especially in a diseased state, give way and burst, leaving the outer coat alone to form the walls of the aneurismal tumor. This admits of a considerable amount of distention; but it eventually bursts, and then the unrestrained current gushes out with violence, and the patient dies from loss of blood. Sometimes, however, the dense cellular sheath of the artery, though very distensible, is strong enough to retain the blood for a time after the rupture of the proper walls of the artery, and the aneurismal sac may thus be very much enlarged, and not give rise to fatal hæmorrhage. At times, in fact, this external sac allows the ruptured walls within to partially collapse; the current flows as usual; the blood in the external sac coagulates and forms a clot around the ruptured part beneath; the clot increases from its stagnant state outside the current, and eventually plugs up even the ruptured parts, extending into the diseased artery and plugging up the tube, thus forcing the current to flow more abundantly through collateral channels, enlarging the walls of neighboring arteries, and forming a spontaneous cure for the original disease. This is a very rare occurrence. The tumor usually enlarges by degrees, pressing upon the nerves and tissues near it, and causing pain as well as absorption of the soft or bony structures against which it presses. An aneurismal tumor always pulsates strongly, and can generally be distinguished from all other tumors by this characteristic feature. It sometimes happens, however, that an artery pulsating beneath an abscess or an ordinary tumor causes the latter to simulate to some extent this pulsating character, and hence arise at times errors of diagnosis of a serious character; real aneurisms have been mistaken for abscesses lying upon a pulsating artery, and when opened under this impression to let out pus, the blood has gushed out from an aneurismal tumor, and the error has proved fatal. Ruysch relates that a friend of his opened a tumor near the heel, not suspecting it to be an aneurism, and the hæmorrhage, though stopped at last, placed the life of the patient in great danger. Boerhaave was consulted by a patient on a swelling of the knee, and, suspecting it to be an aneurism, cautioned him against having it opened; but it was opened by another person, and the man died on the spot. It is said that Ferrand, the head surgeon of the Hôtel Dieu in Paris, mistook an axillary aneurism for an abscess, plunged his bistoury into the swelling, and killed the patient. Such mistakes, however, can hardly happen now, as all the best works on surgery give ample instructions on the means of diagnosis in this and other important diseases.—The cure of aneurism consists in the obliteration of the diseased portion of the artery, by passing a ligature around the sound portion of the vessel at some distance above the locality of the tumor. The merit of this method of cure is due to the celebrated John Hunter, who, observing that the old practice of passing the ligature upon the artery immediately above the tumor often failed, was led to think that the arterial walls, being diseased near the tumor, could not sustain the process of inflammation necessary to cause the tissues to adhere; and consequently he undertook to tie the femoral artery in a case of popliteal aneurism, and was perfectly successful. Since then his method has been universally adopted. Recently many attempts have been made, some of them with considerable success, to produce a similar result, either by continuous pressure over the artery kept up for a day or two, or by a ligature applied temporarily to the artery and withdrawn as soon as coagulation has taken place in the aneurism and the neighboring portion of the artery. By whatever means this is accomplished, the flow of blood is stopped in the large vessels below the ligature; but the secondary vessels communicate with each other so abundantly in all parts of the limb, by what is called anastomosis, that the blood soon finds its way through these smaller channels, and enlarges them by slow degrees to suit the wants of nutrition.

ANFOSSI, Pasquale, an Italian composer, born in Naples in 1729, died in Rome in 1797. He was a pupil of Sacchini and Piccini, the latter of whom in 1771 procured him an engagement in Rome. His first successes were in 1773, with the opera *L'Incognita perseguitata*, and several others immediately succeeding. His serious opera *L'Olimpiade* having failed, he went to Venice, and in 1780 to Paris, where his *Incognita perseguitata*, with a French libretto, was not well received. In 1783 he was manager of the Italian opera in London, and in 1787 returned to Rome, where he enjoyed henceforth uninterrupted popularity. Of his works, which are now little known, the best are *L'avaro*, *Il curioso indiscreto*, and *I viaggiatori felici*.

ANGARA, a river of Siberia, which enters Lake Baikal at its N. extremity, under the name of Upper Angara, leaves it near the S. W. end as the Lower Angara or Upper Tunguska, flows past Irkutsk, pursues a N. and W. course for about 750 m., until it is joined by the river Tchadobet, continues in a westerly direction about 250 m. further, and empties into the Yenisei, E. of Yeniseisk.

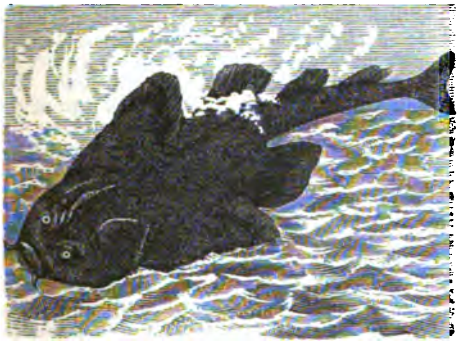
ANGEL (Gr. ἄγγελος, a messenger), a name given in Jewish and Christian theology to certain spiritual beings endowed with superhuman powers of intelligence and of will. They are frequently mentioned in the Old as well as the New Testament as immediate instruments of Divine Providence. In Scripture, however, the original word not unfrequently has its primary signification of messenger, even where rendered angel in the Vulgate and the English version. They are regarded as pure spirits in whose existence there is nothing material. They often appear in the Scriptures with bodies and in the human form; but it was in the early church and still is a matter of theological dispute whether these bodies and this form were only assumed by them for a time for the special purpose of conversing with men. Besides these good angels, the church recognizes a class of "fallen angels," who left their first estate and are now "angels of the devil." The second council of Constantinople, contrary to the opinion of Origen, declared that there are different classes of angels; and since Dionysius the Areopagite the opinion that there are nine classes of angels has become prevalent in the Catholic and eastern churches. It was a common opinion among the fathers of the early Christian church that every individual is under the care of a particular angel who is assigned to him as a guardian; but Protestant theology finds nothing in the Bible to support this notion. While the older Protestant churches, in general, agree in the doctrine of the angels with the Catholic and eastern churches, they reject as unbiblical the opinion of the latter that it is good and useful to ask the good angels for their protection, aid, and intercession, and to venerate their images. According to the critical school of Protestant theology, the belief in angels was foreign to the early religion of the Jews, and derived from the Persians about the time of the Babylonish captivity. Several prominent Protestant theologians of modern times, like Schleiermacher and Hase, deny the existence of angels altogether, regarding them as creatures of Biblical poetry; others, like Martensen and Rothe, endeavor to establish the doctrine on a new speculative basis; while Swedenborg and his followers regard the angels of the Bible and all spiritual creatures as disembodied human beings, who have at some time existed in the flesh in this or some other world. (See NEW JERUSALEM CHURCH.) Pictures of the angels were expressly allowed by the second council of Nice. They are usually represented in the human form, in the male sex, as beautiful youths; the rapidity with which they are supposed to carry out the commands of God is symbolized by wings, flowing garments, and naked feet; harps and other musical instruments which are placed in their hands are intended to indicate that they incessantly sing the praise of God.

ANGEL (in French *ange d'or*, *angelot*, *angelottus*, *angelus*), a coin so named from the figure of



the archangel Michael and the dragon stamped on one side of it. It was originally a French coin, first struck in 1340, with the French arms on the obverse. It was introduced into England in the reign of Edward IV., and called angel. Its value was then 6*s.* 8*d.*; under Henry VIII. it was raised to 8*s.*, and under Charles I. to 10*s.*, after which its coinage ceased.

ANGEL FISH, the common name of the *squatina angelus* (Dum.), a representative of the family of *squatinidæ*, intermediate between the sharks and rays. The body is flattened above and below, and discoid in shape on account of the broad pectorals and ventrals, as in rays; the mouth is very wide and at the end of the snout; the eyes small and on the dorsal aspect, with the large spout holes behind them; the head rounded anteriorly; the pectorals separated from the head by a furrow in which are the long and closely approximated gill openings; two dorsals, both on the tail, further back than the ventrals; tail keeled on the sides, and the caudal nearly or quite symmetrical; male claspers small; scales conical, with a terminal point; teeth conical, irregular, with interspaces. It is the only genus of the family, and this, the best known species, is called shark ray from its appearance, angel fish from the resemblance of the expanded pectorals to wings, monk fish from its rounded head seeming to be enveloped in a cowl, and fiddle fish from its general shape. It attains a length of 7 or 8 feet, and is rough and mottled with brown and bluish gray above, smooth and dirty white below; the lighter pectorals are bordered with brown, the nostrils covered by a ciliated membrane, and along the back is a row of spines. It is not uncommon in the European seas, and in the Mediterranean, where it was known to Aristotle, in whose time, as now, the rough skin was used to polish wood. It is gregarious, fierce and dangerous to approach, hideous, very voracious, swimming near the bottom, and feeding on flat fishes and other species living in the mud and sand. The young are produced alive in June. The flesh is white, coarse, and tasteless, though formerly esteemed as food. A species has been described on the American coast as the *S. Dumerili* (Lesueur).



Angel Fish (Squatina angelus).

ANGELI, Filippo, an Italian painter, born in Rome, lived in his youth in Naples, whence he is sometimes called the Neapolitan, and died in Florence about 1645. He excelled in landscape painting, and was one of the first to observe the strict rules of perspective in works of that class. His works are rare and dear.

ANGELICO, Fra, the familiar appellation of one of the most celebrated of the early Italian painters, born at Mugello, Tuscany, in 1387, died in Rome about 1455. At the age of 20 he entered the monastery at San Domenico, near Fiesole, where he took the cloistral name of Giovanni da Fiesole. Previous to this time, according to Vasari, he had borne the name of Giovanni Guido di Mugello, and according to others that of Santi Tosini. Here he passed the remainder of his days in the devout discharge of his religious duties and the pursuit of his art. From the beauty of his angels and glorified saints he was called by his countrymen *il beato* (the blessed) and *angelico* (the angelic). He painted only sacred subjects, would never accept money for his pictures, and never commenced them without prayer. He visited Rome at the command of Nicholas V. to decorate the papal chapel. The pope offered to make him archbishop of Florence, a dignity which his humility would not permit him to accept, but which he succeeded in procuring for a brother monk. He painted frescoes in his own monastery and in the church of Santa Maria Novella at Florence, and numerous easel pictures, of which the Louvre possesses a noble specimen, the "Coronation of the Virgin." In many details of art he was excelled by his contemporaries; but, in the language of Mrs. Jameson, "the expression of ecstatic faith and hope, or serene contemplation, has never been placed before us as in his pictures."

ANGELINA, an E. county of Texas, bounded N. E. by Angelina river, and S. W. by the Neches; area, 1,059 sq. m.; pop. in 1870, 3,985, of whom 742 were colored. The county abounds in heavy timber, oak, pine, beech, holly, hickory, magnolia, sweet gum, sugar maple, ash, sassafras, cane brakes, cypress, mulberry, &c. The soil is black, and in the bottoms sandy. Corn, cotton, sugar cane, rice, and tobacco are the principal products. Large numbers of hogs are raised and sent to market. There are two steam saw mills, but no other manufactories. Petroleum is abundant. Capital, Homer.

ANGELL, Joseph K., an American writer on law, born in Providence, R. I., April 30, 1794, died in Boston, May 1, 1857. He graduated at Brown university in 1813, edited the "United States Law Intelligencer and Review" from 1828 to 1831, and was for several years reporter of the decisions of the supreme court of Rhode Island. He published treatises, between 1824 and 1854, on the "Common Law in relation to

Water Courses," the "Right of Property in Tide Waters," the "Law of Private Corporations," the "Limitation of Actions," the "Liabilities and Rights of Common Carriers," and the "Law of Fire and Life Insurance." At the time of his death he was employed in preparing a treatise on the "Law of Highways," which was completed by Thomas Durfee. Lord Brougham esteemed his work on the "Limitation of Actions" very highly.

ANGELN, or **Anglen** (Lat. *Anglia Minor;* Dan. *Angel*), a district about 300 sq. m. in extent, in Schleswig, bordering on the Baltic and the bay of Flensburg. It is the only territory on the continent which has preserved the name of the tribe of Angles. The present inhabitants are distinguished for bodily strength, industry, and morality.

ANGELO, Michel. See Buonarroti.

ANGELUS DOMINI, a short form of prayer which Catholics are accustomed to recite in honor of the incarnation, at sunrise, noon, and sunset, at the ringing of a bell, called the Angelus bell. This custom originated with the ringing of the bells on the eve of festivals. Pope John XXII. (1327) ordered that at the ringing of the bells on these occasions all the faithful should recite three Ave Marias. The council of Lavaur (1368) ordered that the bell should be rung also at sunrise. The Angelus at noon is attributed by some to Pope Calixtus III. (1456), and by others to King Louis XI. (1472). Mabillon thinks that the Angelus as now practised is of French origin, and became general at the beginning of the 16th century.

ANGELUS SILESIUS, whose real name was Johann Scheffler, a German philosophical poet, born at Breslau, in Silesia, in 1624, died there, July 9, 1677. After receiving a medical degree, he travelled through Holland, became court physician to the emperor Ferdinand III., embraced in 1653 the Roman Catholic faith, afterward became a priest and councillor to the bishop of Breslau, and finally retired to a cloister. He is the author of a system kindred to that of the mystic pantheists Tauler and Böhme, of whose writings he had been a student. His peculiar faith is mainly expressed in poems, of which he published collections, with the titles of "The Cherub's Guide Book," "Spiritual Pastorals," "The Troubled Psyche," and "The String of Pearls."

ANGERMAN, Angerman-aa, or **Angerman-elf,** a river of northern Sweden, rises in the lake of Kult, on the Norwegian frontier, and, after flowing S. E. through the provinces of Westerbotten and Westernorrland for 240 m., falls into the gulf of Bothnia, 12 m. N. of Hernosand. It is navigable to Sollefteå, about 60 m. It passes through many lakes, contains numerous islands, and is noted for its fine scenery.

ANGERMÜNDE, a town of Prussia, in the Potsdam district of the province of Brandenburg, on Lake Münde and about 40 m. by railway N. E. of Berlin; pop. in 1871, 6,412. It trades in wool, tobacco, and yarn, and there are fisheries, breweries, and manufactories of hosiery and cloth.

ANGERS (anc. *Juliomagus,* in the territory of the Andecavi or Andegavi), an old city of France, capital of the department of Maine-et-Loire, situated on the Mayenne, 4 m. from its junction with the Loire, 161 m. S. W. of Paris, on the line of the Tours and Nantes railway; pop. in 1866, 54,791. It has a college and seminary, a government sail-cloth manufactory, and various manufactories of linen, woollen, cotton, and silk stuffs; also tanneries and sugar and wax refineries; and contains the mother house of the Sisters of the Good Shepherd. In the vicinity are extensive slate quarries. Its chief curiosities are the ruins of a castle of the old dukes of Anjou, a cathedral containing the monument of Margaret of Anjou, remains of a Roman aqueduct, and a museum with 600 pictures. It has a library, a botanical garden, and a school of arts and trades. The university, founded in 1246, and once among the most famous schools of learning in Europe, and the royal academy of belles-lettres, established by Louis XIV. in 1685, were destroyed during the revolution. In 1585 the castle was surprised by the Huguenots, and in 1793 the city was besieged by the Vendeans, when the inhabitants endured great sufferings. Lord Chatham and the duke of Wellington studied here at a military school. David the sculptor was born here.

ANGHIERA, Pietro Martire d' (called in English Peter Martyr), an Italian historian and geographer, born at Arona on Lago Maggiore in 1455, died in the city of Granada in 1526. He was of noble extraction, and at the age of 22 went to finish his education at Rome. In 1488 he accompanied the Spanish ambassador to Spain, where he served in two campaigns against the Moors, and then entered the church, and opened a school for the young nobility. In 1501 he visited the sultan of Egypt on a mission from King Ferdinand, and took occasion to explore the pyramids and some of the most striking remains of antiquity. The king obtained for him the title of apostolic prothonotary, and in 1505 made him prior of the church of Granada. Charles V. afterward presented him with a rich abbey. The historical works of Peter Martyr are among the best sources of information respecting the important age in which he lived. His literary remains comprise his *Opus Epistolarum,* a collection of letters in 38 books, in which almost every event of public importance from 1488 to 1525 is recorded; a history of the new world entitled *De Rebus Oceanicis et Orbe Novo,* written from original documents furnished by Columbus, and from statements made to the council of the Indies, of which he was a member; an account of newly discovered islands and their inhabitants; and a report of his visit to Egypt, under the title of *De Legatione Babylonica.*

ANGILBERT, Saint, minister of Charlemagne, and the most distinguished poet of his age, born in Neustria, now Normandy, died Feb. 18, 814. He studied under Alcuin with Charlemagne; received Bertha, the daughter of that prince, in marriage; was appointed prime minister of Pepin, king of Italy; and after returning to France was intrusted with a portion of the government, and became secretary and minister to Charlemagne. With the consent of his wife he entered in 790 the monastery of Centule or St. Riquier, of which he became abbot in 794. He often left his retreat to attend to interests of state or to ecclesiastical affairs, and made four journeys to Rome, in the last of which he accompanied Charlemagne and saw him crowned emperor of the West. Angilbert was a correspondent of Alcuin, and was called the Homer of his time. His poems and a history of the abbey of Centule are marked by much elegance.

ANGINA PECTORIS (Lat. *angere*, to suffocate), a disease so named from a sense of suffocating contraction or tightening of the chest, over the sternum, causing anguish and fear of sudden death. A sudden attack of severe pain in the lower part of the chest, commonly inclining to the left side and extending down the left arm, is the most prominent symptom of the disease. The pain sometimes affects the right arm, and is often attended with palpitation of the heart and a sensation of fainting; but the latter symptoms are not constant. The pulse is commonly accelerated, though otherwise very slightly affected. The countenance is pallid, and the expression anxious and depressed. There is no regular interval between the paroxysms nor distinct warnings of return. They come on suddenly and unexpectedly, from slight causes, and often when no immediate cause can be assigned, and last from a few minutes to half an hour or more. The health is often tolerably good between the intervals when first the disease comes on, but by degrees it fails, and various uneasy sensations distress the patient in the intervals of paroxysms. The respiration becomes labored and digestion difficult.—The nature of this disease is still involved in some obscurity. It seems to be mainly an affection of the nerves, complicated with symptoms of a rheumatic or a gouty nature, and often also with disease of the vessels. The morbid appearances which are found after death are most frequently ossification of the small vessels that supply the heart itself, commonly called coronary arteries; ossification of the valves of the heart; excessive accumulation of fat on its external surface; enlargement of its cavities, and change of structure in its muscular substance, which becomes soft and flabby, thin, and easily torn. Although the hardening of the coronary arteries and the valves of the heart has been generally called ossification, the term is a misnomer; for there is no real ossification, but a hardening and thickening of the parts by earthy deposits, such as are observed in the blood vessels and in the joints of certain rheumatic and gouty constitutions. The degenerations and morbid appearances of the vessels, valves, and tissues of the heart are therefore often quite analogous to those observed in other parts of the body, in patients suffering from gout and rheumatism and certain kinds of aneurisms, with morbid deposits in the distended and thickened walls of the arteries. Still, these symptoms are not constant, and cases are not infrequent in which the patients have suffered much during life from attacks of angina pectoris, and yet in which no morbid changes whatever have been found after death, either in the heart or blood vessels. Much has been done to ascertain the primary seat and the nature of this disease, but physicians are not as yet unanimous in their opinions. The majority believe it to be primarily a nervous affection, the nerves at fault being those which supply the lungs and the heart. It differs from neuralgia properly so called in several most important features, although the sudden violent shooting pains are not unlike those of tic douloureux and other forms of severe neuralgia. In so far as the latter disease may be chiefly caused by swelling and inflammation of the sheaths of the nerves, there is a strong analogy; but careful observation suggests that the gouty or rheumatic diathesis, whatever be the nature and the cause of that peculiar cachexia, lies at the bottom of the disease of the heart known as angina pectoris; and that the neuralgic pains are no more violent and sudden in the paroxysms of this disease than they are in gout and certain forms of rheumatism. The seat of the disease, however, renders the same paroxysms more alarming. There are undoubted instances on record in which angina pectoris has been completely cured, the paroxysms growing more moderate in character and less frequent in their recurrence, and finally passing off altogether, leaving the patient in a state of sound health. On the whole, however, the malady is a dangerous one, having a tendency to become worse rather than better, the patient's health gradually deteriorating, and death finally taking place, either from syncope during one of the paroxysms, or from one of the complications mentioned above, by which the disease is so frequently accompanied.—Angina pectoris seldom affects young people. It most frequently occurs in the meridian of life or in the descending phase of existence. It is much more frequent in the male than in the female. Sir John Forbes and M. Lartigue found that out of 155 cases 140 were males and only 15 females. The following list of 64 cases by M. Lartigue shows its comparative frequency at different ages: At 17 years, 1; 21, 1; 29, 1; 30 to 35, 6; 40, 2; 41 to 50, 11; 51 to 60, 25; 61 to 70, 13; 71 to 77, 4. When the disease is far advanced, paroxysms are easily brought on by mental or moral emotions. Absolute rest of body and tranquillity of mind are necessary while the paroxysm lasts. The head and chest should be raised, and the body seated in an easy chair; and where the disease is far advanced, the patient should sleep in this position.

ANGLE, a portion of space between two lines or between two or more surfaces intersecting each other. Geometry distinguishes four kinds of angles: plane, spherical, dihedral, and polyhedral. 1. *Plane angles.* When two lines are situated in the same plane and not parallel to each other, they intersect at some point, and around this point of intersection they form four plane angles; the point of intersection is called the vertex, and the lines the sides of the angles. If all the four angles thus formed are equal, they are called right angles, and the lines are said to be perpendicular to one another; when not equal, those smaller than a right angle are called acute, and those larger obtuse angles. Angles are measured by degrees, which are nothing but angles so small that 360 of them are situated around one point, and therefore 90 in a right angle. For practical measurement of angles the circumference of a circle is divided into 360 equal parts (see fig. 1), and its centre laid on the vertex of the angle, in which case the parts of the circumference between the sides of the angle will indicate the number of degrees contained in the same.

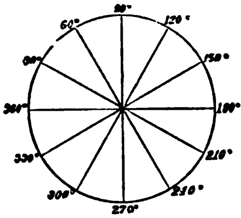


FIG. 1.—Plane Angles.

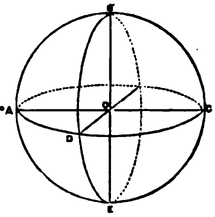


FIG. 2.—Spherical Angles.

Each degree is again divided into 60 parts called minutes, and each minute into 60 seconds. The whole circumference of the circle is therefore subdivided into 1,296,000 seconds, which is about the limit of accuracy of astronomers in measuring angles at the firmament. When angles have curved sides (as represented in fig. 2), tangents are drawn to the curves at the vertex, and the angle these tangents make with one another is measured. 2. *Spherical angles.* Under this name is designated the space included between two arcs of great circles, drawn on a sphere. A D and B D, fig. 2, form together a spherical angle, which, if the plane B O E D is perpendicular to the plane A O C D, is a spherical right angle: the intersections of the meridians with the equator of the earth are such right angles, while the intersections of the meridians at the poles form a number of acute spherical angles. The angles which the astronomers measure in their celestial triangles are all spherical angles. 3. *Dihedral angles* are formed by the intersection of two planes. The planes A B C D and A B F E, fig. 3, form a dihedral angle; the line of intersection, A B, is called the edge, and the planes are called the faces. Such angles are measured by the plane angle formed when passing a plane perpendicular through the edge, or, what is the same, drawing two lines O T and S T from the same point in the edge A B, perpendicular to the same, and one in each plane; the arc S T is in that case the measure of the dihedral angle.

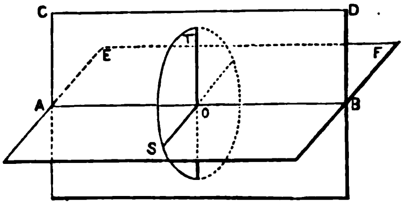


FIG. 3.—Dihedral Angles.

4. *Polyhedral angles* are the spaces included between three or more planes which intersect at one point. Thus O, fig. 4, is the vertex of a trihedral, and O, fig. 5, the vertex of a tetrahedral angle, respectively bounded by three and four faces.

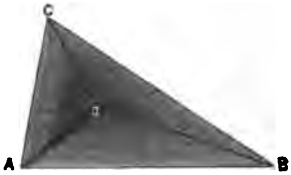


FIG. 4.—Trihedral Angle.

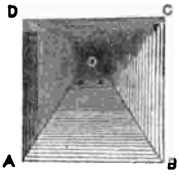


FIG. 5.—Tetrahedral Angle.

As an arc of a circle is used for measuring plane and dihedral angles, so a portion of the surface of a sphere, of which the centre is at the vertex, is used to measure polyhedral angles.—**Angle of Total Reflection.** When a ray of light falls on a polished surface separating a transparent denser medium from a similar rarer one, it will be reflected and refracted, that is, split up into two rays; one of which will be thrown back, and the other will pass on and be diverted more or less from its course. Such a splitting up of a ray of light always takes place when it passes from a rarer into a denser medium. But when the light passes from a denser into a rarer medium, for instance, from glass into air, this will not be the case under all inclinations of the ray. When the angle of incidence is not very acute, no refraction, but total reflection, will take place. Let A B O represent a cross section of a glass prism; then the ray D R will be split up, being reflected to R E and refracted to R R, because the angle of incidence, D R Q, is very acute, the ray F T, however, making with the perpendicular T P a less acute angle. As F T P is only reflected in the direction T G, and not refracted at all, it cannot pass out of the prism at T, and this constitutes there a case of total reflection. The minimum number of degrees required for such a case is calculated according to a law discovered by Descartes, which is that "the sines of the angles of incidence and refraction bear a fixed relation to one another, different for each substance." When the calculation gives for the sine of the angle of refraction a quantity greater than 1, it gives a sine which cannot exist, which indicates that no refraction can exist in this case, and that consequently all the light is reflected. The smallest angle of incidence with which this takes place, or the angle of total reflection, differs according to the relative power of refraction of the two transparent media. For light passing into air, it is when coming from water 48° 30′; from crown glass, 42°; from flint glass, 38°; and from diamond, 24°. This is one of the reasons of the special brilliant lustre of the last-named substance.—For other special applications of the term (angle of incidence, of least deviation, of polarization, of repose), see Mechanics, Polarization, and Spectrum.

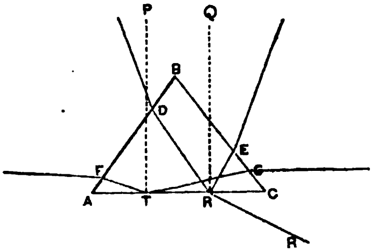


Fig. 6.—Angle of Total Reflection.

ANGLER FISH. See Goose Fish.

ANGLES, or **Angli,** an ancient German tribe which, after various migrations, settled in Denmark, and thence passed over in great numbers to England, to which they gave their name. Tacitus in his *Germania* mentions this tribe by name. Lendenbrog and Leibnitz (*Scriptores Rerum Brunsuicensium*) have preserved some fragments of the ancient laws used in common by the Angli and the Varini. On the continent their name has only been preserved in the district of Schleswig called Angeln, and history would have let them drop entirely into oblivion, but for the circumstance that their immigration into Britain gave to the greater portion of the southern part of that island the name of Angle-land, England. (See Anglo-Saxons.)

ANGLESEA, or **Anglesey,** a small island in the Irish sea, on the coast of Wales, from which it is separated by the Menai strait, constituting a county; area, 302 sq. m.; pop. in 1871, 50,919. The chief agricultural products are oats and barley. Cattle and sheep are largely raised. The copper mines at Parys and Mona, once very productive, have much declined. The chief towns are Beaumaris, the county seat, Holyhead, Llangefni, and Amlwch, which unite in returning one member to parliament, besides the county member. The Menai strait is crossed by a fine suspension bridge, one of the earliest and most perfect specimens of this style of structure, also by the Britannia tubular bridge of the Chelsea and Holyhead railway, one of the great triumphs of modern science and enterprise. (See Bridge.) Anglesea was known to the Romans as Mona, and was the last stronghold of the Druids, of whose religion various cromlechs and other remains are still extant. On the N. W. end of the island is the smaller island of Holyhead.

ANGLESEY, Earl of. See Annesley.

ANGLESEY, Henry William Paget, first marquis of, and second earl of Uxbridge, a British general, born May 17, 1768, died April 29, 1854. He received his education at Westminster and at Christ Church, Oxford. In 1793 he raised a regiment of infantry at his own expense among his father's tenantry in Staffordshire, with which he served in the campaign in Flanders; and in 1799 he commanded a regiment of cavalry in Holland, and ultimately became the most distinguished cavalry officer in the service. In 1808 he joined Sir John Moore in Spain, as commander of the two cavalry brigades. He defeated the French at Mayaga, and repulsed their advanced guard at Benevente, where he took Gen. Lefebvre-Desnouettes prisoner, and covered Sir John Moore's celebrated retreat, which ended in the battle of Corunna, where a charge by him decided the fate of the day. Returning to England in 1809, he did not serve again till the battle of Waterloo, where he commanded the heavy cavalry, and headed the terrible British charge that annihilated the French cuirassiers. In this action he lost a leg. He had inherited the earldom of Uxbridge in 1812, and on July 4, 1815, he was created marquis of Anglesey. At the coronation of George IV. he was lord high steward of England. In 1827 he became a member of Canning's cabinet as master general of the ordnance, and in 1828, under Wellington, lord lieutenant of Ireland. In these offices he was exceedingly popular from the impartiality of his administration, while his firmness secured him the respect of all. In December, 1828, in a letter to Archbishop Curtis, the Roman Catholic primate of Ireland, he expressed opinions so favorable to Catholic emancipation that his recall was determined upon, and he quitted Dublin Dec. 19, amid the regret of all classes. In 1830, under Earl Grey, he was restored to his post. The severe measures now employed against O'Connell's repeal agitation destroyed his former popularity in Ireland, and led to the overthrow of Earl Grey's ministry and his own retirement in 1833. In 1846 he again became master general of the ordnance, and was made field marshal. He finally retired from office in 1852. He married in 1795 the daughter of the fourth earl of Jersey, from whom he was divorced in 1810, and soon afterward married Lady Cowley, daughter of the first earl of Cadogan, who had also just been divorced. His former wife soon married the duke of Argyll.

ANGLING, the art of taking fish by means of the rod, line, and hook. It probably was never a popular recreation with any of the more civilized peoples of antiquity, but in England it early became a favorite sport. One of the earliest books printed in the English language is a small folio republication of "The Boke of St. Albans," issued in 1496 by Wynkin de Worde, and containing a "Treatise of Fishing with an Angle." The fish which have always been the keenest object of the skilful fisherman's pursuit, both as the best on the board when taken, and as affording the greatest sport to the taker, are those of the salmon family, including the true or sea salmon, the sea trout, the lake trout of several varieties, and the brook trout. For fly-fishing, the rod for salmon fishing should be from 16 to 18 feet long, pliable, elastic, and tapering; with a reel capable of containing 100 yards of strong, evenly plaited hair line, tapering gradually from end to end, and terminating in a leader of the best round silkworm gut, to which is attached the foot length of a large, gaudily colored salmon fly. The trout fly rod is of the same general character, but shorter, lighter, and capable of being easily managed with one hand; whereas the salmon rod requires the use of both, and takes a strong and practised man to wield it with effect through a whole day's fishing. From 10 to 12 feet will be long enough for an ordinary fly rod, and from 30 to 40 yards of line will be an ample allowance. Trout flies are much smaller, and usually much more gravely colored, than the salmon flies most in use. The object in fly-fishing is to throw the fly well out, and, letting it drop on the water as lightly and naturally as possible, to keep it playing and dancing in the eddies, with motions simulating those of a drowning insect. The fish of America most valued by the angler are the trout, striped bass, the black bass of the lakes, and the rock bass; several varieties of pike, from the gigantic muscalonge of the basin of the St. Lawrence down to the little Long Island pickerel, which rarely exceeds 10 inches in length; the pike perch, known as the glass-eye or Ohio salmon, in the western waters; the perch; the carp; and many other species and varieties, of various degrees of size and excellence, down to the little, many-colored pond fish.—The principal differences between bait-fishing and fly-fishing consist in the use of the fish or the worm with trolling, spinning, roving, or stationary tackle. Trolling and spinning are both practised with dead fish, to which the angler, by the play of his wrist and line, conveys a motion in the water similar to that of swimming. The bluefish and Spanish mackerel are caught by trolling, but instead of bait the hook is attached to a piece of bright metal or bone, shaped somewhat like a small fish. In spinning, swivels are used, and a series of small hooks, tied on fine gut, are applied to the bait externally, which is fastened to the line head upward, with a slight curve given to the tail, so that the action of the swivel and the force of the current cause it to play with a rotatory motion in the water. Roving is performed with a small live fish, hooked, so as not to injure him seriously, through the dorsal fin or the lip, and suffered to swim about at his own pleasure, within such limits as are accorded to him by the length of line. Bottom fishing requires a weighted line, a cork float, and worm, paste, or shellfish bait; it is adopted for trout and perch fishing in rivers, and for taking many sorts of sea fish in bays and tideways.—The following are the titles of a few of the most valuable works on angling, published within a few years: Scrope's "Days and Nights of Salmon Fishing"; "The Book of the Salmon," by Andrew Young; Sir Humphry Davy's "Salmonia"; Pulman's "Vade Mecum of Fly-fishing for Trout"; "Handbook of Angling," by Ephemera; "The Rod and Line," by Hewett Wheatley; Ronald's "Fly-fisher's Entomology." These are all English works, to which may be added the following American publications: Dr. Bethune's edition of Izaak Walton's "Complete Angler," Frank Forrester's "Fish and Fishing," Brown's "Angler's Guide," Lanman's "Adventures," Roosevelt's "Superior Fishing" and "Game Fish of the North," and G. C. Scott's "Fishing in American Waters."

ANGLO-SAXONS, the Teutonic people who in the 5th and 6th centuries passed over from their territory in and near the Cimbric (Danish) peninsula to the island of Britain, then just abandoned by the Romans. They first acted as auxiliaries to the British against the Picts and Scots, but afterward subdued and overspread the country, establishing themselves as its permanent inhabitants, while the aboriginal races gradually disappeared before their rapid growth. They were principally collected from three nations, the Saxons, Angles, and Jutes, all members of the great Saxon confederation, a rough union of Teutonic tribes effected during the 4th century, under the Saxon hegemony, for mutual advancement and protection. (See SAXONS.) The Saxons inhabited the country called North Albingia or Eala Saexen, extending from the Elbe to the Eider, on the W. side of the Cimbric peninsula, and divided into Ditmarsia, Stormaria, and Holsatia—districts which still retain these names. The Jutes inhabited South Jutland, now Schleswig. The territory of the Angles was probably the district of Angeln, now also within the limits of Schleswig. These tribes, celebrated for naval prowess, had made several piratical expeditions to the British coast before the abandonment of the island by the Romans. According to the statement of old histories, the details of which are not now fully credited by critical writers, it was the knowledge of them thus acquired by the Britons that led these latter to call upon them for aid, when, about A. D. 449, Vortigern, the leading British chief of the time, found him self unable to withstand the increasing inroads of the Picts and Scots, the barbarous tribes inhabiting the north of the island. In response to his invitations, it is said, the Saxon chiefs Hengist and Horsa, who were visiting the coast for some unexplained but probably predatory purpose, came to the assistance of the British with only a few hundred men, yet with such effect that the Picts and Scots were almost immediately defeated. While it is now generally admitted that the names of these chieftains are probably mythical, the fact that many Saxon settlers landed at this time in Britain, and the account of the general events which followed, are unquestionably matters of history. The Picts and Scots were overcome, and the country, already somewhat cultivated and with much of the luxury of a Roman province, soon aroused the cupidity of the strangers. They sent for large reënforcements of their countrymen, and turned their arms against the inhabitants. From this time Saxons constantly poured into the island, and by gradual steps, which it is now impossible to trace, the native Britons were completely subjugated by the new people, who overspread the whole country, introduced their laws, customs, and language, and became the acknowledged founders of most of its future institutions. As successive bands arrived, they landed on different parts of the coast, and their leaders founded separate states. Turner gives an elaborate chronology of these, fixing the date of the establishment of each, and the name of its founder; but later investigations have shown upon how doubtful a basis these accounts must rest. The little that is actually known of the events of the century following the landing of the first Saxon settlers may be said to be the one fact that at different times during that period new detachments of the invaders, with their chiefs, founded eight kingdoms, as follows, mentioning them in their most probable chronological order: Kent, Sussex, Wessex, East Anglia, Mercia, Essex, Bernicia, and Deira, the last two afterward joined in Northumbria. Gradually, during the 8th century, these became united in the alliance called the Saxon heptarchy—though it should properly be called the octarchy; and finally, about 827, they were united into one kingdom, called Anglia, or England (A. S. *Engla-land*), by King Egbert of Wessex. The history of the eight separate sovereignties until this final union presents in general only a series of wars between them, of oppression of the conquered Britons, who revolted again and again, and of such changes in the boundaries of the various kingdoms as render it almost impossible for us to correctly define their limits at any one point of time. The progress of the Saxons after their union under Egbert belongs to the history of England; but their customs, and those laws and institutions which grew up under the heptarchy and under Egbert and his successors, can best be treated here.—At the head of each of the governments of the heptarchy, and at the head of the whole nation after its union under Egbert, stood the king (*cyning*). He was first chosen from among the leaders of the people, but afterward the office became in some sense hereditary, though not according to the modern laws of succession; for although the new king must be chosen from the descendants or immediate relatives of the late ruler, a younger son was often preferred to the eldest, or a brother's family to the direct heirs, the choice in fact depending greatly on personal qualifications. The king's power was at first decidedly limited by the witenagemote, or supreme council (parliament); but afterward it became more nearly absolute. He determined the rank of his immediate followers, summoned the witenagemote, led in war, &c. The queen (*cwen*) was held in great respect; offences against her were punished like those against the king; and she often played a conspicuous part in the government. Next in rank were the æthelings or nobility; and this term included in early times only the immediate family and near relatives of the king. Just below the ætheling, and in time coming to share many of his privileges, was the ealdorman. Officials of many kinds bore this title, but it was at first generally applied to the governor of a province, who led its forces in war and superintended its affairs in peace. The title was not in early times hereditary, but became so after the reign of Alfred. The thanes (*thegnas*) composed the next class, and were landholders, forming a "nobility by service," as it is called by Lappenberg, divided, according to position and immediate attachment, into king's thanes and subordinate thanes. Upon the possession of a certain amount of landed property depended generally their title; though merchants who had made three voyages of a certain length were also entitled to the rank of thanes. The thanes were exactly similar to the barons after the Norman conquest. Below these classes were the common freemen or churls (*ceorlas*), rarely entirely independent men, but generally standing in the relation of retainer to some chief. The lowest class of all was that of the *theowas* or slaves, made up of those prisoners of war who had been reduced to servitude, of the descendants of Roman slaves, and of those made servile as a punishment for crime. These could not be sold outside the country, and in general seem to have been nearly as well off, save in civic rights, as the poorer churls. The chiefs of the Christian clergy occupied high positions, the archbishop holding the privileges and rank of an ætheling, the bishop that of an ealdorman. They were also prominent members of the witenagemote. —The country of the Saxons was divided into shires, each composed of a certain number (varying greatly in different cases) of hundreds; and these in their turn were made up of those districts which united in choosing (originally) 100 men for the defence of the shire and its governor. "The meeting of the hundred," says Lappenberg, "was held monthly for objects of voluntary and contentious jurisdiction. The presiding officer was the ealdorman, assisted by the bishop of the diocese and the principal thanes. The townships were represented by their reeves [sheriffs] and four deputies." In northern England a similar division was called a wapentake. A tithing was an association of freemen, who bound themselves to become surety for one another in case of misbehavior, and to aid in bringing to trial any one of their number who should commit a criminal offence. Every freeman was obliged by law to enroll himself in such an association. —Among the most cherished Anglo-Saxon institutions was also the *folcmote.* Authorities disagree somewhat as to the nature and privileges of the assemblies thus named, but the term seems to have been freely applied to large gatherings of freemen for counsel on public measures, rather than to any organized convention of the people. The right of meeting in folcmote seems to have corresponded exactly to the modern right of assembling in public gatherings, and of free debate.—See Palgrave's "Rise and Progress of England under the Anglo-Saxons" (London, 1832); Lappenberg's "History of England under the Anglo-Saxon Kings" (English translation by B. Thorpe, London, 1845); "Six Old English Chronicles," edited by J. A. Giles (London, 1848); J. M. Kemble's "Saxons in England" (London, 1849); Sharon Turner's "History of the Anglo-Saxons" (7th ed., London, 1852); "The Anglo-Saxon Chronicle," edited with a translation by B. Thorpe (London, 1861).—**Anglo-Saxon Church.** The Teutonic invaders of Britain, after the fall of the Roman empire of the West, were of course pagans, and, with the pride of a conquering in presence of a conquered race, would not receive Christianity from the Welsh Christians. Pope Gregory the Great sent a solemn embassy of 40 Benedictines to Ethelbert, king of Kent, who had espoused Bertha, a Frankish princess. St. Augustin, known as the apostle of the English, was at the head of it. The king consented to be baptized in 597, and Augustin was appointed archbishop of Canterbury. From Kent Christianity rapidly spread among the other Anglo-Saxon kingdoms. In 664 a union of all the churches in Britain was made by the exertions of Theodore, afterward archbishop of Canterbury, and in 668 the services of the church were made uniform over the island. Under Theodore there were an archbishop of York and 15 bishops. During the 8th and 9th centuries the Anglo-Saxon church enjoyed a degree of independence which was not quite canonical. By the aid of Dunstan in the latter part of the 10th century, it was brought into more complete harmony with the Roman see. This church produced the venerable Bede, St. Boniface, the apostle of the Germans, and many others who contributed to the cause of learning and the spreading of Christianity among the pagan nations of the north. Its history has been carefully investigated by Soames, author of "The Anglo-Saxon Church" and "The Latin Church during Anglo-Saxon Times," and by Lingard, "Antiquities of the Anglo-Saxon Church."—**Anglo-Saxon Jurisprudence.** The memorials that have come down to us afford but an imperfect view of Anglo-Saxon laws. Codes are spoken of as having been promulgated by several of their kings, but these do not appear to have been a collection of all the laws in force, but rather such regulations as were new or little known, and which supplemented the body of laws contained in the unwritten customs with which the people were familiar. The very idea of a complete code would have been far in advance of the time. Ethelbert, king of Kent, is said to have published laws as early as A. D. 561. The first laws of much note were those of Ina, king of the West Saxons, after which we have the laws of Alfred, Edward his son, Ethelred, and Canute. The general features of all are similar; they are permeated with the prevailing superstition of the period; they consist in the main of regulations of police more or less barbarous in character, intermingled with moral and religious precepts derived from the ecclesiastics who framed them. The laws of Ina thus commenced: "First, we command that God's servants hold the lawful rule; after that we command that the law and doom of the whole folk be thus held," &c.; and among the first of the laws is one that if a slave be put to work on Sunday, he shall be free. The churls and their tenure, which is the origin of the modern copyholds, are referred to. The next important laws are those of Alfred, which became more famous than they deserved through the admirable manner in which they were administered by that monarch. The first attempt at settling an orderly course of procedure in administering justice was in the laws of Edward the Elder. While these prescribed the trial by ordeal in cases where compurgators did not come forward, yet they provided that trial should be by sworn witnesses as much as possible. The laws of Canute were more complete than any which preceded them, and better deserving the name of a code. They begin as follows: "Let God's justice be exalted; and henceforth let every man, both poor and rich, be esteemed worthy of folc-right, and let just doom be doomed to him." They prescribed regular terms of court, regulated weights and measures as well as moneys, and punished counterfeiters with the cutting off of hands. A freeman who was not infamous, and had never failed in oath or ordeal, could clear himself with a single oath; but others must furnish compurgators or submit to the ordeal. It has been a common supposition that Edward the Confessor promulgated a code of written laws, but of this there is no sufficient evidence. The Anglo-Saxons after the conquest exhibited a strong attachment to the laws of their last king, and the conqueror caused a compilation of them to be made; but it contained little of importance, or that would be likely to be thought important by the people beyond a recognition of their right to assemble in full folcmote to elect their sheriff and discuss public affairs. The meagre character of the Saxon compilations is accounted for by the fact that the great body of their law, like that of the English law to this day, consisted of unwritten customs and usages with which the people were familiar, and which the conqueror did not attempt to set aside. Many of these customs, as well as the divisions of the country for administrative and judicial purposes, were of Roman origin. Justice was administered in local courts, of which the chief were the *hundredgemote* or *wapentake*, held by the sheriff and bishop for the trial of criminal causes in every hundred—the sheriff presiding assisted by the bishop on the trial of offences in general, and the bishop with the assistance of the sheriff when offenders against the church were to be dealt with; and the *scyregemote* or county court, which was the principal court of civil jurisdiction, and whose judges were the freemen and landholders of the county, presided over by the earl or sheriff, assisted by the bishop. The Saxons appear to have accepted the idea that the king was the fountain of justice, but his intervention was not often invoked except to set the courts in motion when justice was delayed or refused. From the rude trials by witnesses in their popular tribunals was developed at length the orderly system of trial by jury. The "Mirror of Justice" enumerates several judges who were hanged in Alfred's reign for causing prisoners to be executed who were not convicted by the unanimous verdict of twelve sworn men. The most remarkable feature of Anglo-Saxon criminal law was the scale of compensation prescribed for the commission of homicide and other crimes. Even the life of the king was rated at a money value, which under the laws of Athelstan was 30,000 thrymsæ, each thrymsa being worth four pence; while that of an earl was 15,000, and so on down to a common person, rated at only 267. The ears, the teeth, the limbs had each their separate value, and the place where an offence was committed was sometimes an aggravation requiring an additional penalty. The compensation or *were* was payable to the injured person, or, in cases of homicide, to the immediate family of the deceased, or, if he had none, to his other relations. If the offender was unable to pay, he was liable to death, but was allowed to submit to the loss of limb or other corporal infliction instead. Torture to extract evidence was unknown among the Anglo-Saxons. Immunity seems to have been extended in some cases to those who in the heat of passion excited by the chase of an offender should slay him upon the spot, while the irregular infliction of punishment in cold blood upon a detected criminal was visited with extreme penalties. An offender fleeing to sanctuary was allowed protection during his stay there, whatever his crime might have been. Lands among this people appear to have been held by a species of feudal tenure, and were descendible to all the sons, or, as some writers think, to all the children equally, and they were conveyed either by writing or by ceremonies conducted in the presence of witnesses, designed to give publicity to the transfer. A collection of the laws of the Saxon kings was made by Lambard in the time of Queen Elizabeth, under the title of *Archaionomia*, which was afterward republished by Dr. Wilkins, and also more recently under the title of "Anglo-Saxon Laws and Institutes," edited by Benjamin Thorpe (London, 1840).

ANGLO-SAXONS, Language and Literature of the. The language of the German tribes who conquered and peopled Britain in the 5th and 6th centuries was by them called Anglisc, Englisc (English); but since English has become so widely different from its mother speech, the name Anglo-Saxon has come into use for the old language. This language was a growth on the island of Britain from the collision of many dialects spoken by the invading tribes. The Celts used a very different kind of speech, so that the Celtic affected the Anglo-Saxon as the tongues of the aborigines of America have affected our English; it gave a good many geographical names, and but few other words. The new language was shaped to literary use by ecclesiastics who wrote and spoke Latin, and a large part of the literature is translated or imitated from Latin works. Hence it contains many words from Latin and frequent imitations of Latin idiom, and it attained the power to render Latin with more accuracy and ease than any other Germanic tongue of its time. The Danes also contributed something to it, especially to the Northumbrian dialect. But it is after all a true Low German speech, closely akin to Frisic, Old Saxon, Dutch, and Platt-Deutsch. The talk in the harbors of Antwerp, Bremen, and Hamburg is said to be often mistaken by English sailors for corrupt English. These Low German tongues are akin to the High German on one side and to the Scandinavian on the other, and these all with the Mœso-Gothic constitute the Teutonic class of languages, which belongs, with the Latin, Greek, Slavic, Sanskrit, and the like, to the Indo-European. The invading tribes had writing of their own in characters called runes, but the literary remains are almost all in an alphabet known as the Anglo-Saxon, the letters of which, except three, are Roman characters, with some fanciful variations. Thorn (þ) and wên (ƿ) are runes, and edh (ð) a crossed *d*. Occasionally k, q, v, z get into the manuscripts, mostly in foreign words, and uu or u for ƿ. The Semi-Saxon has a peculiar character for j (ȝ). The vowels were pronounced nearly as they now are in German: *a* as in *far*; *â* as in *fall*;

Old Forms.		Roman.		Names.
Ā	a	A	a	ah
Æ	æ	Æ	æ	ă
B	b	B	b	bay
C	c	C	c	cay
D	ꝺ	D	d	day
Ð	ð	DH	dh	edh
Є	e	E	e	ay
F	ꝼ	F	f	ef
Ᵹ	ᵹ	G	g	gay
Ꝥ Ƿ	h	H	h	hah
I	ı	I	i	ee
L	l	L	l	el
ꟽ	m	M	m	em
N	n	N	n	en
O	o	O	o	o
P	p	P	p	pay
R	ꞃ	R	r	er
S	ꞅ	S	s	es
T	ꞇ	T	t	tay
Ꝥ Ƿ	þ	TH	th	thorn
U	u	U	u	oo
Ƿ	ƿ	VV (W)	vv (w)	wên
X	x	X	x	ex
Y	ẏ	Y	y	ypsilon

æ as *a* in *glad; ǽ* as *a* in *dare; e* as in *let; é* as in *they; i* as in *dim; í* as *ee* in *deem; o* as in *wholly; ó* as in *holy; u* as in *full; ú* as *oo* in *fool; y* nearly like *u* in *music* or the French *u; ý* the same sound prolonged. The consonants were pronounced as in English, except that *c* was always like *k*, *g* as in *give*, and both letters were distinctly sounded in initial *hl*, *hr*, *hw*, *wl*, *wr*, *cn*. The changes to the modern English sounds have most of them occurred since the time of Chaucer, many since Shakespeare. There are many words common to Anglo-Saxon, Gothic, and Latin, Greek, or Sanskrit. When we compare the spelling of such words, we find that the Anglo-Saxon retains the original vowels better than the Gothic. It has the old *á*, *ǽ*, while the Gothic has changed to *ó* or *é;* and the old *í*, while the Gothic has *ei*. In its consonant system it agrees with the Gothic, and is midway between the old forms of the Greek, or Latin, and High German. Each surd mute of the Greek or Latin is in Anglo-Saxon changed into its cognate aspirate: *t* to *th*, Latin *tu*, A. S. *thú*, thou; *p* to *ph=f*, Lat. *ped-es*, A. S. *fét*, feet; *c* to *ch=h*, Lat. *cannab-is*, A. S. *henep*, hemp. Each sonant mute changes into its cognate surd: *d* to *t*, Lat. *dent-es*, A. S. *téth*, teeth; *b* to *p*, Lat. canna*b*-is, A. S. hene*p*, hemp; *g* to *c*, Lat. e*g*-o, A. S. i*c*, I. Each aspirate mute changed to sonant: *th* to *d*, Gr. *thér*, A. S. *deór*, deer; *ph=f* to *b*, Lat. *frater*, A. S. *bróther*, brother; *ch=h* to *g*, Lat. *homo*, A. S. *guma*, man. These changes were complete in the 8d century, and here the Anglo-Saxon has remained, while the High German has shifted in the same way a second time, changing *ic*, I, to *ich; thú*, thou, to *du; deór*, deer, to *thier*, and the like; so that Anglo-Saxon stands in the same relation to German that Sanskrit, Greek, and Latin do to Anglo-Saxon. A marked fact in this speech is the sensitiveness of the vowels to the influence of other letters. A stem *a* may appear as *æ*, *ea*, *e*, or *o*, according to the vowel or consonant after it; and so with other letters. In cases where *i* follows the stem, *man* changes to *men;* so *fót* to *fét*, feet; *gós* to *gés*, geese; *mús* to *mýs*, mice, and the like. Such changes are called *umlaut*. Breaking is produced by a consonant, as when *c* or *g* changes *a* to *ea:* Lat. *castrum* to *ceaster;* or *l* or *r* changes a preceding *i* to *eo: meolc*, milk.—There are inflection endings for five cases, three numbers, and three genders; but the instrumental case is rare, and the dual number is found only in pronouns. The substantive has four declensions distinguished by the endings of the genitive singular—*es*, *e*, *a*, *an*. The three first come from old vowel stems, the last from a consonant stem.

First Declension.

Singular.	*An. Sax.*	*English.*	*German.*	*Latin.*
Nominative,	wulf,	wolf,	wolf,	anser.
Genitive,	wulfes,	wolf's,	wolfes,	anseris.
Dative,	wulfe,	to or for a wolf,	wolfe,	anseri.
Accusative,	wulf,	wolf,	wolf,	anserem.
Instrumental,	wulfê, or ŷ,	by or with a wolf,	——(ablative)	ansere.
Plural.				
Nominative,	wulfâs,	wolves,	wölfe,	anseres.
Genitive,	wulfâ,	of wolves,	wölfe,	anserum.
Dative,	wulfum,	to or for wolves,	wölfen,	anseribus.
Accusative,	wulfâs,	wolves,	wölfe,	anseres.
Instrumental,	wulfum,	by or with wolves,	——(ablative)	anseribus.

Fourth Declension.

Singular.	*An. Sax.*	*English.*	*German.*
Nominative,	oxa,	ox,	ochse.
Genitive,	oxan,	of an ox,	ochsen.
Dative,	oxan,	to or for an ox,	ochsen.
Accusative,	oxan,	ox,	ochsen.
Plural.			
Nom. and Acc.	oxan,	oxen,	ochsen.
Genitive,	oxenâ,	of oxen,	ochsen.
Dative,	oxum,	to or for oxen,	ochsen.

The common English endings of the possessive and plural are from the first declension. The *-en* of *oxen* is from the fourth. Neuters have no plural sign, and so some English words from them do not yet always use it: *sheep*, *deer*, *swine*, *folk*, *hair*, *head*, *hundred*, *year*, and the like. The old feminines were declined somewhat like the Latin first, with a genitive in *-e*, and we find a few examples of it in Chaucer. Gender is determined by the endings of words; it agrees generally with the German: *wîf-man*, woman, is regularly masculine because it ends in *man; wîf*, wife, is neuter; *sunne*, sun, is feminine; *móna*, moon, is masculine. Each adjective may be declined in two ways according as it is definite or indefinite, as in German.

An ending *-e* is found in Chaucer to indicate sometimes the plural, sometimes the definite declension. Comparison in Anglo-Saxon was by endings, *-r*, *-st;* not by *more* and *most*.

THE PERSONAL PRONOUNS.

	SINGULAR.	PLURAL.	DUAL.
Nom.	ic, *I.*	wê, *we.*	wit, *we two.*
Gen.	min, *mine, of me.*	ûser, ûre, *our.*	uncer, *of us two.*
Dat.	mê, *to* or *for me.*	ûs, *us.*	unc, *to us two.*
Acc.	mec, mê, *me.*	ûsic, ûs, *us.*	uncit, unc, *us two.*
Nom.	thû, *thou.*	yê, *ye.*	git, *ye two.*
Gen.	thin, *thine, of thee.*	eôwer, *your.*	incer, *of you two.*
Dat.	thê, *to* or *for thee.*	eôw, *you.*	inc, *to you two.*
Acc.	thec, thê, *thee.*	eôwic, eôw, *you.*	incit, inc, *you two.*

SINGULAR.	Masc.	Fem.	Neut.	PLURAL, all genders.
Nom.	he.	heô, *she.*	hit, *it.*	hi, *they.*
Gen.	his.	hire, *her.*	his, *its.*	hirâ, *their.*
Dat.	him.	hire, *her.*	him, *it.*	him, *them.*
Acc.	hine.	heô, *her.*	hit, *it.*	hi, *them.*

The English *she*, *they*, *their*, *them*, are from the Anglo-Saxon demonstrative *se*, *seó*, *that;* *its* is a modern growth, not found in the first edition of our English Bible. The articles are both in use, and the demonstratives *thæt*, that, and *thes*, this, plural *thás*, those; the personals are used as reflexives; *hwá*, who, is an interrogative; other English pronouns are from Anglo-Saxon originals. So are the numerals except second, A. S. *other*.—There are two great classes of verbs: 1, the ancient or strong class, which formed their past tense by reduplication, repetition of their root; 2, the modern or weak class, which formed their past tense by composition with *dide*, did. In the first class there are five conjugations, distinguished by the vowel of the past tense. 1. The original root is *a*, unchanged in the past: *swimman*, *swam*, *swummen*, swim, swam, swum. 2. The root is *i*, changed to *á* in the past: *rídan*, *rád*, *riden*, ride, rode, ridden. 3. The root is *u*, changed to *eó*, *o*, past *eá: cleófan*, *cleáf*, *clofen*, cleave, clove, cloven. 4. The root was *á*, changed to *a*, past *ó: wacan*, *wóc*, *wacen*, wake, woke, waken. 5. The root a diphthong or long vowel changed to *eó*, *é:* *feallan*, *feól*, *feallen*, fall, fell, fallen. The weak verbs make another conjugation: 6. The past a compound with *dide*, *-de: lufian*, *lufóde*, *lufód*, love, loved, loved. The *umlaut* and breaking referred to in the first part of this article introduce variations of vowel in different parts of the same verb, and different variations for different verbs, so that to a superficial view there may appear to be many conjugations, or no regularity at all. The following paradigms show the inflection endings:

INDICATIVE MODE.

Present and future tense.	Past, strong.	Past, weak.
1, nime, *take.*	nam, *took.*	lufôde, *loved.*
2, nimest, *takest.*	nâme, *tookest.*	lufôdest, *lovedst.*
3, nimeth, *taketh.*	nam, *took.*	lufôde, *loved.*
1, 2, 3, nimath, *take.*	nâmon, *took.*	lufôdon, *loved.*

SUBJUNCTIVE MODE.

	Present.	Past.
Singular,	1, 2, 3, nime.	nâme.
Plural,	1, 2, 3, nimen.	nâmen.

	Imperative.	Infinitive.
Singular,	nim.	niman.
Plural,	nimath.	Gerund, tô nimenne

PARTICIPLES.

Present, nimende, *taking.*
Passive, numen, *taken;* gelufôd, *loved.*

The *-th* of the indicative 3d singular and the plural appears as *-s* in the northern dialect of Anglo-Saxon. There are said to be 168 plurals in *-s* and 46 in *-th* in the Shakespearian folio of 1623. (Prof. T. R. Lounsberry, "On Certain Forms of the English Verb," in "Transactions of the American Philological Association," 1869–'70.) The subjunctive is used for our potential and imperative, as in the English expressions, "it were a sin," "be it so"; but a periphrastic potential in *may*, *can*, *might*, &c., is in use. The gerund in *-enne* changed to *-ende* and then to *-ing;* and in the English we have in the ending *-ing* a verbal noun, present participle, and gerund mixed. The form given above as the present tense may be used for any modification of both present and future act, the other form to express every shade of past act; but auxiliaries are also used. A perfect in *habbe*, have, and a pluperfect in *hæfde*, had, are in full use, though the participle of the principal verb is often in the accusative case agreeing with the object of *habbe: hé hæfth mon geworhtne*, he has man wrought. A few intransitives use *eom* (am) and *wæs* (was) for perfect signs: *hé is gecumen*, he is come; *hé wæs ágán*, he was (=had) gone. *Sceal*, shall, and *wille*, will, are common for future signs, though they generally have some meaning of duty, power, promise, resolve, in addition to that of future time. A progressive form is common in the active: *is feohtende*, is fighting, continues fighting; but not in the passive. The emphatic form in *do* hardly occurs. The adverbs, prepositions, conjunctions, and other particles are many of them common to other Indo-European tongues, and many of the more obscure may be traced to pronouns. Composition is more freely used in Anglo-Saxon than in English, and many of the suffixes and prefixes are there found as separate words.—A body of rules almost as great as those used in Latin grammar is needed to state the uses of the different cases. Some verbs govern a genitive, some a dative or instrumental, some the accusative, some two or three different cases. The uses of the subjunctive mode are various and obscure. The arrangement of the parts of a sentence is often intricate. The syntax is that of a highly inflected language. Most of the difficulties of English idiom are to be traced to Anglo-Saxon combinations, and they are often easily understood by the help of the old meanings of the words, or the old inflection forms.—For the study of the language may be used Bosworth, "Anglo-Saxon Dictionary" (London, 1848); Marsh, "English Language and its Early Literature" (New York, 1862); Hadley, "Brief History of the English Language," in Webster's Dictionary (1865); Rask's grammar, translated by Thorpe (London, 1865); Shute, "Manual of Anglo-Saxon for Beginners" (New York, 1867); March, "Comparative Grammar of the Anglo-Saxon," and "Introduction to the Study of Anglo-Saxon" (New York, 1870); Corson, "Handbook of Anglo-Saxon and Early English" (New York, 1871); Grimm, *Deutsche Grammatik* (Göttingen, 1840); Ettmüller, *Lexicon cum Synopsi Grammatica* (Quedlinburg and Leipsic, 1851); Heyne, *Kurtz Laut- und Flexionslehre* (Paderborn, 1862); Koch, *Historische Grammatik der englischen Sprache* (Weimar, 1863); Grein, *Sprachschatz der Angelsächsischen Dichter* (Cassel and Göttingen, 1864); Maetzner, *Englische Grammatik* (Berlin, 1865).—**Anglo-Saxon Literature.** It was a habit of the early Germans to give high honor to the *scôp* or poet, and long before their conquest of Britain there were current among them cycles of songs, of mythological and heroic ballads, such as furnish the material for epic poems. Their exploits in Britain doubtless added to the number of current ballads, and of skilful poets and singers. We learn from Beda that the harp passed from hand to hand at feasts, and that it was disgraceful for any man not to be able to sing in turn. Bishop Aldhelm used to stand in minstrel's garb on the bridge over which the people were to pass and collect a crowd by the beauty of his song, into which, when their attention was gained, he wove words of devotion. The verse common to the northern nations was brought to great perfection among the Anglo-Saxons. It is an accentual rhythm, marked off into verses by alliteration. The common narrative verse is constructed in sections separated by a metrical pause. Each section has regularly four accents. This accent or metrical stress falls on each syllable having a primary accent in prose, on many syllables having a secondary accent, and in certain metrical emergencies on other syllables, especially the last syllable in each section. Each metrical stress is followed by a remission of voice, which may be silent, or filled by an unaccented syllable or two. Each perfect line contains three alliterating words, two in the first section, and one in the first part of the second section.

Cy'ning sceal' mid ceá'pĕ   cwē'nē' gebic'gan',
bu'num' and beá'gum':   bu' sceo'lon æ'rest
geo'fum gōd' wes'an'.

A king shall with cattel   a queen buy,
with beakers and bracelets: both should first
in gifts good be.   (Gnom. Exon., line 82+.)

Many lines have but one alliterating word in the first section, and irregular sections have three or sometimes only two feet. Rhyme is found occasionally in most poems. A few contain rhyming passages of some length. One is known as the rime song. It contains 87 verses in all sorts of rimes, and is plainly a task poem to show riming skill.

flāh' māh' flī'teth'   flān' mān' hwī'teth',
borg'-sorg' bī'teth',   bald' ald' thwī'teth, &c.
Scyl'dum' biscē'redē'   scyn'dan' gener'edē'
wom'mum' biwē'redē'   wul'drē geher'edē', &c.

Subtle fiend fighteth,   darts sin whetteth,
borrow-sorrow biteth,   bold old severeth, &c.
From sins freed   let us escape saved
from stains covered,   gloriously honored, &c.

Almost all the Anglo-Saxon poetry we have is in this verse, varied occasionally by passages in longer verses of similar construction. It is the common verse in Old Saxon, and in Icelandic has been cultivated into a surprising variety of artificial meters. The poems remaining in Anglo-Saxon are few. The Christians destroyed whatever was tainted with paganism, and the Normans neglected everything Anglo-Saxon. They have been divided into seven classes. 1. *The ballad epic.* Of this we have one poem and a few fragments. "Beowulf" is a poem of 3,183 lines, celebrating the exploits of a Gothic prince Beowulf, for the most part in slaying monsters. The scene is laid in the island of Seeland and the opposite Gothland. It is evidently a pagan production, though rewritten by a Christian. Only one copy of it is known, and no mention of it has been found elsewhere. A few names and facts referred to in it have however been identified in old German history, and serve to show that it embodies historical matter of the end of the 5th century. The manuscript is thought to be of the 10th century. Its existence is mentioned in Wanley's catalogue, 1705. In 1731 it was badly injured by fire. In 1786 the Dane Thorkelin had two copies of it made, and in 1815 published an edition. No particular notice was taken of it till the late revival of Anglo-Saxon scholarship; but the present generation of Anglo-Saxon scholars, especially in Germany, have studied it with great enthusiasm, and find in it the Iliad and Odyssey of the north. Among many editions, translations, and essays of elucidation and criticism, we mention Kemble, edition (London, 1833) and translation and glossary (1837); Ettmüller, translation and valuable notes and introduction (Zürich, 1840); Thorpe, text, translation, and glossary (Oxford, 1855); Grein, two editions (Göttingen, 1857 and 1867), and translation (1857); Gruntvig, text and notes (Copenhagen, 1861); Heyne, two editions with notes and glossary (Paderborn, 1863, 1868), and translation (1863); Wackerbarth, translation into rhymed English verses like Scott's "Marmion" (London, 1849); Haigh, "The Anglo-Saxon Sagas," containing a notable attempt to locate Beowulf on English ground (London, 1861); Morley, "English Writers," vol. i. (London, 1867). A few fragments may be classed with "Beowulf," as "The Traveller's Song," 143 lines; "The Fight at Finnsburg," 48 lines; "Bryhtnoth," 325 lines; the first two to be found in Thorpe and Kemble, and all in Grein (1857). 2. *The Bible epic.* This is a growth of Christian England. We have the story of its originator, Cædmon, from Beda, who lived near him, and may have seen him. He was an unlearned man, so backward that he could not take his turn in singing to the harp at feasts, and so sensitive that he would leave the board in shame as the harp came round. Once when he had done this, and fallen asleep in a stall near by, a vision appeared to him, and bade him sing. "I cannot sing," said he; "I have left the feast and come here because I cannot sing." "Sing for me though," said the vision; "sing the creation." And he sang the famous verses which were to usher in a new era of song:

Nu scylun hergan hefaenricaes uard,
metudæs mæcti end his modgidanc,
uerc uuldur fadur; sue he uundra gihuaes
eci dryctin or astelidæ.
He aerist scop aelda barnum
heben til hrofe, haleg scepen:
tha middungeard moncynnæs uard
eci dryctin, æfter tiadæ,
firum foldan, frea allmectig.

"Now must we glorify the guardian of heaven's kingdom,
the maker's might, and his mind's thought,
the work of the worshipped father when of his wonders each one,
the ever living lord ordered the origin,
He erst created for earth's children
heaven as a high roof, the holy creator:
then this mid world did man's guardian
the ever living lord afterward prepare,
for men a mansion, the master almighty."
(Hadley's translation.)

Next morning he told his story and repeated the verses. The abbess Hild and her learned men proved him, and found that he could turn into noble poetry passages from the Bible which they read to him. They recognized the gift as divine, and received him into the monastery. There he led a holy life, humble and lovely, and composed many Christian poems. Hosts of imitators followed. The "Hêliand," a poem of some 6,000 lines in Old Saxon, celebrating the acts of the Saviour, is thought by many to be a translation from Cædmon. But none equalled him till Milton. A single manuscript remains, containing Genesis (2,985 lines), Exodus (589), Daniel (765), Christ and Satan (733). All that is known of it is that it belonged to Archbishop Usher, who gave it to Junius, who printed it at Amsterdam in 1655, and who bequeathed it to the Bodleian library. There is no external evidence to prove these poems Cædmon's, but they have been accepted provisionally by most students as a rewriting of his originals in another dialect. The Genesis gives the story of man's first disobedience and his fall, beginning with the fallen angels. The description of Satan, his first speech, some striking expressions in the description of his fall, of heaven, hell, Adam and Eve, strongly suggest that Milton borrowed from Cædmon, but they may be accounted for by their using common sources. Editions are by Thorpe, for the society of antiquaries (London, 1832; Illuminations, 1833), Grein (Göttingen, 1857, translation, 1857), and Bouterwek (text, translation, copious introductory essays, notes, and lexicon, Gütersloh, 1854). Among the many valuable articles upon it may be mentioned Dietrich's in Haupt's *Zeitschrift*, X., 310–367. With these works of Cædmon may be classed a fragment of Judith (350 lines), Cynewulf's "Christ" (1,694), "The Harrowing of Hell" (137), and some other fragments, all to be found in Grein's *Bibliothek der Angelsächsischen Poesie* (Göttingen, 1857), and translations in his *Dichtungen der Angelsachsen* (1857). 3. *Ecclesiastic narratives*—the lives of saints, and versified chronicles, without the epic exaltation of the former classes. Such are "Andreas" (1,724 lines), "Elene" (1,321), "Juliana" (731), and "Guthlac" (1,353). 4. *Psalms and hymns*—translations of Hebrew psalms and a few Christian hymns and prayers. The version of the Psalms has been attributed to Bishop Aldhelm, (656–709). The manuscript is in the royal library at Paris. Editions have been published by Thorpe and Grein; Essays by Dietrich in Haupt's *Zeitschrift* (IX., 214–222). 5. *Secular lyrics*. A few, mostly elegiac, are found in the Anglo-Saxon Chronicle, celebrating kings and heroes. They are also to be found in Grein's *Bibliothek*. 6. *Allegories, gnomic verses, riddles*. This was a favorite style of composition with the later Anglo-Saxons. We have in Grein's *Bibliothek* "The Phœnix," a translation from Lactantius, much expanded (677 lines); "The Panther" (74); "The Whale" (89); also gnomic verses which are still interesting, and riddles in considerable numbers, and hard enough to guess. 7. *Didactic ethical*. The "Meters of Boëthius" are versifications of passages in Boëthius *De Consolatione Philosophiæ*, attributed to King Alfred. They were transcribed by Junius from a manuscript since lost. Editions are by Rawlinson (Oxford, 1698); Fox, with translation (London, 1835); Grein (1858); and Fox, (2d ed., with metrical rendering by Martin Farquhar Tupper (London, 1864).—The Anglo-Saxon prose is of comparatively little literary value. It affords abundant material for the study of the language and the people, but consists mostly of translations from the Latin. They have been classified as follows: 1. *Theological*—translations of the Bible. Portions of Genesis, Exodus, Leviticus, Numbers, Deuteronomy, Joshua, and Judges, called the Heptateuch, together with an outline of Job, the Gospel of Nicodemus, and a fragment of Judith, were published by Thwaites (Oxford, 1698). The Psalms are spoken of above. We have several manuscripts of the Gospels. Editions have been published in England by Parker (1571), Marshall (1665), Thorpe (1842), and Bosworth (with the Gothic, Wyckliffe, and Tyndale versions in parallel columns, London, 1865). Kemble began an edition with the old Latin and four Anglo-Saxon texts printed together, and various readings from four others. Matthew has been printed in this form, and the work is going on at the University press, Cambridge. A large number of homilies are still to be found. A set by Ælfric, 80 in number, compiled or translated from Latin works, about A. D. 990, for the unlearned, were printed by Thorpe for the Ælfric society (1844–'6). More are promised by the early English text society. 2. *Philosophy*. In this department we have only Alfred's translation of Boëthius, mentioned above. 3. *History*. The Anglo-Saxon Chronicle extends from the invasion of Julius Cæsar to Henry II., 1154. As far as the history of Beda extends, it is abridged from it or from some common source. It has been supposed that Alfred had it compiled and copies placed in the monasteries. How the records were kept afterward is not known. It is for the most part a meagre note of events of little interest, but in the later times there are sometimes reflections and poetical passages, as well as sketches of character. It has been often printed and translated. Thorpe's edition (London, 1861) has seven parallel texts, a translation, and indexes. There are also a large number of charters, deeds, wills, and similar documents remaining, of which Kemble has published six volumes (*Codex Diplomaticus Ævi Saxonici*, London, 1839–'46). Beda's "Ecclesiastical History" was written by him in Latin, and translated into Anglo-Saxon by Alfred. It is one of the world's great books. It has passed through many editions in many countries. Wheloc's edition has Latin and Anglo-Saxon in parallel columns (Cambridge, 1644); and Smith's has various readings (Cambridge, 1722). A new edition is needed. For ancient history there is Alfred's translation of Orosius, with additions by the translator of some value. Thorpe's edition with translation and glossary is in Bohn's library (London, 1857). There are some biographies. St. Guthlac has been repeatedly printed (Goodwin, London, 1848). 4. *Law.* A large body of laws remains, extending from Ethelbert, who was king of Kent at the time of its conversion to Christianity, to those of William the Conqueror. The best editions are those of Thorpe (London, 1840), containing the ecclesiastical institutes, and Schmid (Leipsic, 1858), a critical text with Latin and German translations, notes, and a glossary. These and the charters are perhaps the most valuable prose remaining for the study of the people. 5. *Natural science and medicine.* "Popular Treatises of Science" (Thorpe, London, 1841); "Leechdoms" (3 vols., O. Cockayne, London, 1864–'6). 6. *Grammar.* Ælfric has a Latin grammar in Anglo-Saxon, which answers as a reverse grammar. It is printed in Somner's Dictionary (Oxford, 1659). Ælfric's "Colloquy," in Thorpe's "Analecta Anglo-Saxonica" (London, 1846). There are a few glossaries in Wright (London, 1857).

ANGOLA, in its wider sense, a Portuguese colony on the W. coast of South Africa, Lower Guinea, between lat. 7° 30′ and 17° S. It was discovered by the Portuguese in 1488, and they have ever since held it, except from 1641 to 1648, when the capital and a portion of the colony were occupied by the Dutch. The government general of Angola, as claimed by the Portuguese, embraces an area of upward of 200,000 sq. m. The population is estimated by the Portuguese government at 2,000,000. The colony is divided into four districts, besides the Gimbandi country, which is likewise regarded as belonging to it: Ambriz, Angola proper, Benguela, and Mossamedes. The rule of the Portuguese is recognized between the Koanza and the Dande only, the main part of Angola proper; outside of this territory they have isolated fortified places, and the native chiefs sustain the relation of more or less doubtful vassals. A line of forts which they intended to construct across the continent to connect with their colony of Mozambique in eastern Africa has never been completed, but the country in the interior has been explored to some extent. The soil is very fertile, and the vegetation is luxuriant; the fauna and flora are tropical. Along the rivers sugar cane is raised, and in the primitive forests excellent coffee is found. The climate is unhealthy along the coast. The mountains contain gold, iron, lead, and sulphur. Spring, the rainy season, begins in September. The most intelligent among the natives are the people of the district of Ambaca, most of whom are able to read and write. As roads are almost wholly wanting, the government employs *carregadores* (burden-carriers), who are furnished by the villages. In the district of Golungo-Alto the number of these carriers was estimated by Dr. Livingstone at 6,000. An army of 5,000 men, four war vessels, and the packet service consume nearly the entire revenue of the colony. A Catholic bishop was appointed for Angola about the middle of the 16th century, and a large number of the natives were nominally received into the church; but since the expulsion of the Jesuits, the native churches have been to a large extent without priests, and the population has partly relapsed into paganism. In 1857 there were in the whole diocese only six priests, though the Christian population was estimated at 300,000.—The capital, Saint Paul de Loanda, on the coast of Angola proper, is the seat of the governor general and of the bishop; pop. 12,500, of whom 850 are whites, 2,500 mulattoes, and the remainder negroes. The chief coast towns of the three other districts are Ambriz, São Felipe de Benguela, and Mossamedes. (See GUINEA.)

ANGORA (Turk. *Engurieh;* anc. *Ancyra*), a city of Asia Minor, capital of a Turkish eyalet of the same name, 220 m. E. S. E. of Constantinople; pop. about 45,000, including about 30,000 Turks, 10,000 Armenians, 4,000 Greeks, and 1,000 Jews. It is situated in the midst of a vast elevated plain, abounding in fruits and pasturage, over which the roving tribes of the Turcomans tend their sheep, goats, and horses. The citadel is situated on a steep rock, and its walls are covered with inscriptions. The trade with the west is chiefly in the hands of the Greeks and Armenians, and thus the city in social life is rather European than Mohammedan. It is the see of a Greek and of a Catholic Armenian bishop. On July 20, 1402, Angora was the scene of a terrible battle between Timour and the sultan Bajazet I., in which the latter was captured. There are some ancient remains. (See ANCYRA.)—The Angora goat, with its silken fleece, is the most curious product of this region. Its hair, which is white and soft, and about eight inches long, is shorn twice a year, and is much esteemed as material for shawls. In 1869 the number of these goats in and near Angora was estimated at 1,000,000. The yearly yield of wool is about 2,700,000 lbs. The Angora goat was introduced into South Carolina in 1849, and still more were imported in 1863.

Angora Goat.

ANGORNO, a town of Bornoo, in central Africa, near the S. W. shore of Lake Tchad; pop. said to be above 30,000. Weekly markets are held, at which a very extensive trade is carried on in cotton, amber, metals, slaves, &c.

ANGOSTURA, or **Ciudad Bolivar,** a city of Venezuela, capital of the province of Guayana, on the right bank of the river Orinoco, at a pass (*angostura*) where it is confined between high rocks, about 260 m. S. E. of Caracas; pop. about 7,000. It was founded in 1674, and named San Tomas de la Nueva Guayana, to distinguish it from another San Tomas 82 leagues distant. Its name was changed to Ciudad Bolivar, and subsequently in common speech to Angostura. It is built in the form of an amphitheatre, on the slope of a rocky hill, destitute of vegetation. The houses are massively constructed, usually of two stories. The city is the principal emporium for the commerce of the Orinoco, although 240 m. from the mouth of the river. It is the seat of a bishopric, and contains a college, ecclesiastical seminary, hospital, and a hall in which a session of the congress of Colombia, then including New Granada and Venezuela, was held in 1819. The city is defended by a fort on the opposite side of the river, here 3,100 ft. wide. The exports consist of cotton, cocoa, indigo, hides, sugar, and Angostura bark.

ANGOSTURA BARK, the bark of *galipea officinalis*, a South American tree of the rue family, growing on the river Orinoco, and especially on the Caroni, Venezuela. It possesses a peculiar and disagreeable smell when fresh, and a bitter and slightly aromatic taste. It is sometimes used in medicine as an aromatic tonic. By the natives it is employed to intoxicate fish, as the cinchona is in Peru. The false Angostura may be distinguished by its greater thickness and hardness, its total want of odor, and its intense tenacious bitterness, due to the poisonous alkaloid brucia. When steeped in water it does not become soft like the true Angostura. It is said to be the bark of *strychnos nux-vomica.*

ANGOT, or **Ango, Jean,** a French merchant of Dieppe, died in 1551. He made trading voyages to Africa and the East Indies, and secured a large fortune, which he used with liberality. Some of his ships having been captured by the Portuguese, he fitted out a fleet, fully provided with soldiers and arms, which entered the Tagus and blockaded Lisbon. Every vessel coming to that port was intercepted, while both shores on the river were devastated. The king of Portugal sent an ambassador to Francis I., who referred him to the merchant of Dieppe. Angot, however, persevered, and forced Portugal to pay a large indemnity for his losses. Unsuccessful speculations brought ruin upon him, and the king of France, to whom he had lent large sums, having failed to repay him, Angot spent his last years in destitution.

ANGOULÊME (anc. *Inculisma*, or *Civitas Ecolismensium*), a town of France, capital of the department of Charente and of the ancient province of Angoumois, situated on the Charente, 66 m. N. E. of Bordeaux, on the railway connecting that city with Paris; pop. in 1866, 25,116. It is built on an isolated hill, rising about 200 feet above the river; and though the streets are narrow and crooked, it presents with its white stone houses a neat and cheerful aspect. In the centre of the town is the old ruined castle, the birthplace of Marguerite of Navarre, and remains of the ancient fortifications are also extant. A noble cathedral of the 12th century, the church of St. André dating from the 11th, and a Benedictine abbey of the time of Charlemagne, are among its other antiquities. It has a college, a museum of natural history, manufactures of paper, woollens, linen, earthenware, and cognac, a cannon foundery, and a thriving trade with Bordeaux and the southern departments. It was for some years the seat of a naval school, transferred to Brest in 1830.—From the 9th century Angoulême, with its territory of Angoumois, to which Périgord was at first united, was governed by counts. In 1360 it was ceded to the English, who were driven out in the reign of King Charles V. It afterward belonged to the crown, was erected into a duchy by Francis I., and formed a royal apanage till 1650, since which the title of duke of Angoulême has been only nominal.

ANGOULEME. I. Charles de Valois, duke of, natural son of Charles IX. of France by Marie Touchet, born April 28, 1573, died Sept. 24, 1650. He received from Catharine de' Medici the counties of Auvergne and Lauragais, married the daughter of the constable de Montmorency, distinguished himself at the battles of Arques, Ivry, and Fontaine Française, but was sentenced to perpetual imprisonment for certain intrigues with his uterine sister, the marquise de Verneuil. Released in 1616, he conducted the siege of Soissons the next year, obtained from Louis XIII. the duchy of Angoulême in 1619, and besieged Rochelle in 1628. He took part also in the wars of Languedoc, Germany, and Flanders. He left *Mémoires* of the reigns of Henry III. and Henry IV., a *Relation de l'origine et succès des chérifs, et de l'état des royaumes de Maroc, Fez et Tarudant*, translated from the Spanish of Diego de Torres, and some other writings, all of which have been published. **II. Louis Antoine de Bourbon,** duke of, eldest son of Charles X. of France and Marie Thérèse of Savoy, born at Versailles, Aug. 6, 1775, died at Görz, June 3, 1844. At the outbreak of the revolution he accompanied his father (then duke of Artois) to Turin, where he spent a few years in military studies. In 1792 he received a command in Germany, but he was not fitted for a soldier, and soon withdrew from the field, retiring with his father to Holyrood, and subsequently joining his uncle Louis XVIII. at Blankenburg and Mitau. At the latter place he married, June 10, 1799, his cousin Marie Thérèse Charlotte, daughter of Louis XVI. During the hundred days he was appointed lieutenant general of the kingdom, and made a weak attempt to oppose the emperor; but his troops abandoned him, and after a few days' detention as a prisoner he was sent to Barcelona. After the second restoration he was charged with the suppression of disorders in the southern provinces, and in 1823 commanded the army of intervention which put down the revolution in Spain. In July, 1830, he signed with his father the act of abdication in favor of his nephew the duke of Bordeaux (now Count de Chambord), and went into exile with the rest of the royal family. He was a man of mean abilities and sluggish disposition. **III. Marie Thérèse Charlotte,** duchess of, wife of the preceding, and daughter of Louis XVI. and Marie Antoinette, born at Versailles Dec. 19, 1778, died at Frohsdorf, Oct. 19, 1851. She shared the imprisonment of her parents in the Temple, and after their execution was held in captivity till December, 1795, when Austria procured her liberation in exchange for certain members of the convention. She lived at Vienna till her marriage, known by the title of *madame royale*. Afterward she shared the vicissitudes of her husband's exile, sustaining his courage by her superior spirit and intelligence, returning with him to France in 1814, and exerting a great influence over the troops at Bordeaux during the hundred days, so that Napoleon called her "the only man in the family." At the time of the July revolution she was at Dijon, and made a dangerous journey in disguise to Rambouillet, where she rejoined the duke. She went with the royal family to England, where her husband and she assumed the titles of count and countess of Marne. They lived some time at Holyrood, but the climate of Scotland proving too severe for the countess, they removed to the continent.

ANGOUMOIS, one of the old provinces of France, between Poitou and Guienne, bounded W. by Saintonge, with which it was joined to form a military government. Capital, Angoulême. It nearly corresponded to the present department of Charente. It was generally governed by the counts of Angoulême from the 9th to the 14th century, when it was united to the crown.

ANGRA, a seaport town on the S. side of the island of Terceira, one of the Azores; pop. 13,000. It is well built on a hill rising from the water's edge, has wide but dirty streets, and is generally the residence of the governor of the Azores, as well as of the consuls of England, France, and Holland. The harbor is protected by two forts, but, though the best in the Azores, it is exposed to all winds from the S. S. W. by S. to the E., and on the approach of a gale from this quarter vessels are obliged to put to sea for safety. The principal exports are wine and grain.

ANGUISCIOLA, Angussola, or **Anguissola, Sofonisba,** an Italian female painter, born at Cremona about 1580, died about 1620. After executing a number of portraits and some fine historical pieces, she went to Madrid in 1561, at the invitation of Philip II., and painted portraits of Queen Isabella and other celebrities of the Spanish court. Constant application brought on blindness in her latter years. Vandyke, who visited her frequently, was wont to speak with great respect of her knowledge of art. Her sisters LUCIA, EUROPA, and ANNA MARIA also painted, but were less distinguished than Sofonisba.

ANGUS, Earls of. See DOUGLAS.

ANHALT, a duchy of the German empire, situated on both banks of the Elbe and the Saale, and bounded by Prussian Saxony, Brandenburg, and Brunswick; area, 897 sq. m.; pop. in 1871, 203,354. It was formerly divided into four duchies, called Anhalt-Dessau, Anhalt-Bernburg, Anhalt-Zerbst, and Anhalt-Köthen, after the principal towns, but was in 1793 united into three, in 1853 into two, and finally in 1863 into one. The soil is mostly level and fertile, and here and there wooded and picturesque. It produces corn, flax, tobacco, hops, and fruits. There are iron, lead, and copper mines. The Anhalt family trace their lineage to Esico von Ballenstedt, who flourished in the 10th century. They have been generally of martial spirit, and in the history of Germany they have furnished various distinguished generals in the service of the emperors and of the kings of Prussia. From Anhalt-Zerbst came Catharine II., empress of Russia. The present duke, Frederick, born April 29, 1831, succeeded his father May 22, 1871. Capital, Dessau.

ANHYDRIDES, compounds which become acids upon the addition of water. In technical language, they are the oxides of acid radicals, and stand in the same relation to acids as the oxide of potassium, K_2O, does to the hydrated potash, HKO. The most familiar anhydrides are sulphuric, nitric, hypochlorous, and acetic; these have long been called anhydrous sulphuric acid, anhydrous nitric acid, anhydrous hypochlorous acid, and anhydrous acetic acid; but as they do not possess acid properties until combined with water, it is now proposed to call them sulphuric anhydride, nitric anhydride, &c. The following formulas will illustrate how an anhydride becomes an acid on the addition of water: SO_3 (sulphuric anhydride) + H_2O = H_2SO_4 (sulphuric acid); N_2O_5 (nitric anhydride) + $H_2O = 2HNO_3$ (nitric acid); Cl_2O (hypochlorous anhydride) + $H_2O = 2HClO$ (hypochlorous acid). Anhydride has therefore a signification of its own, and must not be confounded with the term anhydrous, applied to substances which have no water either mixed or combined with them.

ANI, or **Anni,** a ruined city of Turkish Armenia, on the Arpi Tchai, about 25 m. E. S. E. of Kars. Its ancient name appears to have been Abnicum, but its history is only imperfectly known. In the 5th century it was a small fort; in the 10th it became the capital of the Bagratide kings of Armenia; in the 11th it was sacked by the Seljuks, and subsequently occupied by the Kurds; and in the 12th repeatedly taken by the Georgians. In the 14th century it was finally ruined by an earthquake, and has never since been reoccupied. There are numerous ruins of churches, chapels, and private buildings, while the massive walls, about 6 m. in circuit, are in good preservation. —See *Ruines d'Ani*, by M. F. Brosset (2 vols., St. Petersburg, 1860–'61).

ANICET-BOURGEOIS, the popular name of Auguste Anicet Bourgeois, a French playwright, born in Paris, Dec. 25, 1806, died at Pau, Jan. 12, 1871. He was a clerk in a lawyer's office, when he wrote in 1825 his first melodrama, *Gustave, ou le Napolitain*. He afterward produced over 200 plays, most of them in conjunction with other authors, though he was the sole author of his best drama, *La Vénitienne* (1834). His fairy plays have had an immense run, especially *Les pilules du Diable*. He is also believed to have been the real author of *Térésa*, *Angèle*, and other pieces ascribed to Alexandre Dumas. His remains have been removed to Paris, where he was buried May 10, 1872, Alexandre Dumas the younger pronouncing the funeral oration.

ANICETUS, a freedman and preceptor of Nero, and commander of the Prætorian fleet at Cape Misenum, A. D. 59. At Nero's instigation he had a false bottom made for a ship which Agrippina was enticed to visit. She barely escaped drowning, and was soon afterward murdered by Anicetus at her villa, near the Lucrine lake. Seneca, in his defence of Nero, used Anicetus's story of Agrippina's plots against the emperor's life. Anicetus also professed to have had an intrigue with Octavia, so as to furnish Nero with a pretext for her banishment. He subsequently lived in luxury in Sardinia with the money given him by Nero in reward for his infamy.

ANIELLO, Tommaso. See Masaniello.

ANILIC ACID (Spanish *añil*, indigo), an acid produced by the action of diluted nitric acid upon indigo; also called indigotic acid. Carbonic acid is produced with it, and remains in solution, the anilic acid separating it in light yellowish white prisms, which are fusible and volatile, and dissolve in 1,000 parts of water. Their composition is represented by the formula $C_7H_5(NO_2)O_3$, H_2O. Anilic acid decomposes acetate of lead, forming with the lead a crystallized anilate.

ANILINE, a substance discovered in 1826 by O. Unverdorben, in the distillation of indigo. At the present time it is almost exclusively prepared by the deoxidation of nitro-benzole by means of nascent hydrogen evolved from iron filings and acetic acid. This operation is graphically represented by the following formulas: $C_6H_5NO_2$ (nitro-benzole) + $6H = C_6H_7N$ (aniline) + $2H_2O$. Aniline is a colorless oily liquid, of a vinous aromatic odor, and bitter burning taste, and in the air turns brown. Its specific gravity is 1·028. It is slightly soluble in water, to which it imparts a weak alkaline reaction. Alcohol, ether, and the fatty oils dissolve it in all proportions. It solidifies at −8° C., boils at 182° C., and combines with acids and forms salts soluble in water and alcohol. The faintest trace of aniline can be detected by the deep purple violet color which chloride of lime produces with it. It is an active poison, but its salts are said to be harmless. In 1856 Mr. Perkin, while experimenting with aniline, discovered the beautiful purple dye, which was soon introduced into commerce under the name of mauve. Since that time a variety of colors have been produced, and the manufacture of aniline has become an industry of great importance.

ANIMAL. It is difficult to define the word animal, and even a scientific definition distinguishing an animal from a vegetable is scarcely less so. The assertion of Linnæus, that "plants live and grow," while "animals live, grow, and feel," is probably correct; but it is impossible to verify its correctness as applied to the very lowest animals. According to the German naturalists, an animal may consist of a single cell. The idea also till recently maintained, that all animals have a stomach, or internal digestive cavity, is untenable; since many microscopic animals have no trace of a digestive apparatus. Indeed, there is no part or organ common to all animals. The stomach, the heart, and other parts of the circulatory apparatus, the mouth, and even the head, so indispensable in the higher animals, not only in the lower become modified in form and development, but in the lowest even entirely disappear. Nor can muscular fibres or nervous filaments be identified in the latter.—The changes in form of the same organ in different animals can merely be alluded to here. The mouth, for instance, usually single, and opening transversely, is sometimes double, triple, or multiple, and modified into a trunk, or sucker, as in many insects. The heart has but two cavities in fishes, while there are three in reptiles, and four in birds and the mammalia. The same type of structure, however, often extends over a vast number of species of animals. All the vertebrate animals have the same typical skeleton, it being modified in the various species to suit their requirements. The bones of the anterior extremities, for instance, are the basis of the arm and hand of man, of the fore legs of quadrupeds and reptiles, the wings of birds, and the anterior fins of the whale.—Nor are our investigations in regard to function in all cases more satisfactory. Feeling and voluntary motion are certainly characteristic attributes of all but the lowest animals; but some of the latter are endowed with only a kind of motion of a lower grade than the voluntary, and do not give certain evidence of feeling at all. It is therefore not surprising that it was found impossible for a long time to distinguish the lowest animals from the simplest vegetable organisms; and that to these doubtful structures the name of zoöphyte, or animal-plant, was given. Hence it is not proposed here to attempt to give a precise definition of the term animal, but only some of the more striking particulars which distinguish animals from plants. It should, however, be here remarked, in regard to the microscopic animals, or animalcules, that Prof. Agassiz has shown that many of them are merely the ova, or germs of higher animal forms.—1. An organism manifesting the power of sensation or voluntary motion, or possessing a digestive cavity (stomach), or into whose structure enters the nervous or the muscular tissue, is an animal. But, on the other hand, the impossibility of demonstrating either or all of these characteristics does not prove the organism to be a plant, as before stated. Besides, some plants, as the sensitive plant (*mimosa pudica*), withdraw their leaves from the touch of the hand; but not, as there is every reason to believe, in consequence of either sensation or volition. 2. Albumen is the great nutritive element of animals, while starch is that of plants. Some of the lowest plants (*fungi*) are, however, apparent exceptions to this proposition. Consequently, the chemical composition of the tissues of animals differs from that of plants: the basis of vegetable structure is cellulose, a compound of carbon, hydrogen, and oxygen, while those of animals contain nitrogen also in addition. Recent researches show that cellulose is found in some of the lower protozoa. 3. It has been stated that plants absorb carbonic acid gas from the atmosphere, and give out to it pure oxygen, while animals precisely reverse the process. Plants actually, in their nutrition and growth, assimilate the carbon of the carbonic acid of the atmosphere, and return its oxygen to the latter; but in the respiratory process they, like animals, consume the oxygen of the air, and return to it carbonic acid gas. By day, however, they give off less of the latter than of oxygen. 4. For the fixation of carbon in the tissues of plants, as just stated, the constant stimulation of light is indispensable. This is not true to the same degree of animals, whose tissues also consist in part of carbon, as has been seen.—In respect to varieties in size, the animal kingdom presents a far wider range than the vegetable. The extremes in the former are the whale, sometimes 100 feet long and weighing as many tons, and the animalcule, of some species of which 30,000 individuals may inhabit a single drop of water; while in the latter we find on the one hand the *sequoia* of California, 90 feet in circumference, and the talipot of Ceylon, a single leaf of which may shelter 20 men from the rain, and on the other the microscopic fungi, as the yeast plant (*torula cerevisiæ*), or those constituting the mould on decaying substances. Dick calculates that the largest trees of Guiana are 2,985,984,000,000,000 times as large as the rose-leaf plant; while the largest whale is to the minutest animalcule as 34,560,000,000,000,000,000 to 1.—The number of species, and probably of individuals, is also far greater in the animal than in the vegetable kingdom. About 70,000 species of plants may be seen in Paris in a single collection. Balbi 40 years ago estimated the whole number of known species at 80,000; and it has been supposed that there are about 250,000 species in all on the globe. On the other hand, there are at least 100,000 species of animalcules alone. Dick estimated the whole number of species of animals at 300,000, and the number of individuals at 24 billions; while the parts and adaptations of these exceed 60,000 billions.—In regard to rapidity of increase, the highest plants vastly excel the highest animals. An elm of average size sometimes produces 158 million seeds. But the lowest animals and plants manifest the greatest power of multiplication. The *bovista gigantea*, a species of fungus, has been known to increase its size more than a million times during a single night; and Ehrenberg speaks of an animalcule which propagates so rapidly that its descendants would in four days amount to 70 billions.—The scientific study of the animal kingdom constitutes the department of natural science termed zoölogy. Zoögraphy is merely the description of animals; while zoötomy, or comparative anatomy, is the study of their structure, and zoönomy, or comparative physiology, that of their functions. To facilitate these investigations, a scientific classification of the animal kingdom was first published by Linnæus in 1735, in his *Systema Naturæ*. This was improved by G. Cuvier, who spent 17 years in perfecting his system (1795 to 1812), which, being based upon the structure of animals, is termed the anatomical system. Modifications have also been made by Lamarck, Virey, Duméril, and De Blainville; but Cuvier's classification is still generally adopted. He arranged the animal kingdom in four great divisions, viz.: I. The vertebrata (those animals having a spinal column), containing four classes — mammalia, birds, reptiles, and fishes. II. The mollusca. III. The articulata. IV. The radiata. The classes are divided into 72 orders, and the latter into the different genera and species. The classification of Prof. Agassiz, founded on that of Cuvier, is one of the most modern, and in many respects one of the most instructive. It is as follows:

Branch I. RADIATA.

Class 1. *Polypi:* including the 2 orders, actinoids and halcyonoids.
" 2. *Acalephæ:* 3 orders—hydroids (including siphonophoræ), discophoræ, and ctenophoræ.
" 3. *Echinoderms:* 4 orders—crinoids, asteroids, echinoids, and holothurioids.

Branch II. MOLLUSCA.

Class 1. *Acephala:* 4 orders—bryozoa (including the verticellæ), brachiopoda, tunicata, and lamellibranchiata.
" 2. *Gasteropoda:* 3 orders—pteropoda, heteropoda, and gasteropoda proper.
" 3. *Cephalopoda:* 2 orders—tetrabranchiata and dibranchiata.

Branch III. ARTICULATA.

Class 1. *Worms:* 3 orders—trematods (including cestoids, planariæ, and leeches), nematoids (including acanthocephala and gordiacei), and annelides.
" 2. *Crustacea:* 4 orders—rotifera, entomostraca (including cirripeds), tetradecapoda, and decapoda.
" 3. *Insects:* 3 orders—myriapoda, arachnids, and insects proper.

Branch IV. VERTEBRATA.

Class 1. *Myzontes:* 2 orders—myxinoids and cyclostomes.
" 2. *Fishes proper:* 2 orders—ctenoids (as the perch) and cycloids (as the cod). [This division will probably be considerably modified by its author.]
" 3. *Ganoids:* 3 orders—cœlacantha, acipenseroids, and sauroids; and doubtful, the siluroids, plectognathi, and lophobranches.
" 4. *Selachians:* 3 orders—chimæræ, galeodes, and batides.
" 5. *Amphibians:* 3 orders—cæciliæ, ichthyodi, and anoura.
" 6. *Reptiles:* 4 orders—serpents, saurii, rhizodontes, and testudinata.
" 7. *Birds:* 4 orders—natatores, grallæ, rasores, and insessores (including scansores and accipitres).
" 8. *Mammalia:* 3 orders—marsupialia, herbivora, and carnivora.

—As to the chemical composition of animals, probably only 17 out of the 64 simple elements now known, or at most 19, enter into their structure. These are:

Oxygen,
Hydrogen,
Carbon,
Nitrogen,
Copper,
Sulphur,
Phosphorus,
Calcium,
Iodine,
Lead,
Magnesium,
Sodium,
Potassium,
Manganese,
Iron,
Chlorine,
Fluorine,
Silicon,
Bromine.

These elements, variously combined, form numerous compounds, termed the immediate principles of animal structures, of which in the mammalia there are about 90. Of these, some are of mineral origin, as water, common salt, and phosphate and carbonate of lime. Some are formed within the bodies of animals by disassimilation, as urea, uric acid, and creatine; and others still are obtained from vegetable and animal food for the nutrition of the tissues, as albumen, caseine, musculine, and fat, and hence exist as constituent elements in the latter. These immediate principles unite to form the tissues of which the parts and organs of animals are constituted. These are in the vertebrata as follows:

1. *Epithelial Tissue:*
   A. Epidermis and its modifications—nails, hoofs, horns, scales, and shells.
   B. Hair and its modifications—bristles, wool, and feathers.
2. *Elastic Tissue*, its properties much resembling those of gum elastic.
3. *White Fibrous Tissue*, in tendons, ligaments, &c., very strong and almost totally inextensible.
4. *Osseous and Dental Tissues*, in bones and teeth.
5. *Areolar Tissue*, connecting the various organs together.
6. *Adipose Tissue*, otherwise called fat.
7. *Cartilage*, in the joints, those of the ribs, &c.
8. *Muscular Tissue*, the source of motion.
9. *Nervous Tissue*, the seat of sensation and intelligence.
10. *Membranes*, cutaneous (skin), mucous, and serous.
11. *Glands*, the secretory organs.
12. *Vessels*, the blood vessels and the lymphatics.

The tissues of animals are developed directly from the vital fluid, the blood. This in all the vertebrata is red, from the presence of minute cells containing a colored fluid, and which are called the blood corpuscles. In the invertebrate animals no such corpuscles exist, and therefore the blood is colorless. Hence the division of animals into the red-blooded and the white-blooded. The blood of each animal in the central parts of the body has its peculiar natural temperature, that of man being 98° to 99° F. The temperature of all animals lower in the scale than birds is lower than that of human blood, and hence all these are called cold-blooded, while birds and the mammalia are termed warm-blooded animals.—The fecundity of animals also varies inversely with their elevation in the scale. While mammals produce from 1 to 8 or at most 10 young at a time, a tench produces 38,000 and a mackerel 546,000 eggs; and Leeuwenhoek professes to have counted 9,384,000 eggs in a single codfish. Some of the mammals are, however, very prolific. Pennant calculates that the descendants of a single pair of rabbits would, without interference, amount in four years to 1,274,840. But external circumstances exert a powerful influence in this regard. For instance, the pigeon in its wild state broods but twice a year, but when domesticated six, and sometimes even nine times. In the latter case, a single pair would in four years produce 14,762 descendants according to Stillingfleet, and according to Linnæus, over 18,000. The astonishing fecundity of some of the animalcules has already been illustrated. The mammalia alone bring forth their young alive, the duration of gestation being as follows in the following species: elephant, 20 months and 18 days; rhinoceros, 9 months; horse, 11 months; ass, 12 months; cow, 9 months; reindeer, 8 months; buffalo, 12 months; sheep and goat, 5 months; foxes and wolves, 5 months; Greenland whale, about 10 months.—Obviously there must be a correspondence of the structure of an animal to its habits and functions. For example, a carnivorous animal must have great strength and powers of locomotion, enabling it to overtake, seize, and destroy its victim. It must therefore have largely developed muscles and strong bones, and the teeth and jawbones must be especially strong, and the former of a peculiar form for tearing animal tissues. Such an animal must also have an acute sense of smell and of hearing, and a corresponding structure of the organs of these two senses. It is therefore not wonderful that Cuvier could construct an entire animal from having a few of its bones given, and that Agassiz has deduced the form and structure of a fossil fish from its scales alone.—What is nourishment to one animal may prove to be poison to another. Pallas states that hedgehogs eat abundantly of cantharides without inconvenience. The sphinx of a species of caterpillar feeds on the acrid and poisonous juice of the milk thistle (*tythimalis*), and a certain worm on the leaves of the tobacco plant. Bees feed on and obtain honey from the secretions of many poisonous plants; and a kind of buzzard devours the nux vomica. Most animals, however, confine themselves within certain definite limits so far as the sources of their nourishment are concerned. Even the hog, which is usually spoken of as omnivorous, may be mentioned in illustration. It has been found that the ox eats 276 and rejects 218 plants; the sheep, 387 and 141; the goat, 449 and 126; the horse, 262 and 212; while the hog eats but 72 and refuses 171. This animal, therefore, except in cases of necessity, evinces even a superior discrimination in the selection of its food. Some animals never drink at all, drink not being required if the food contain a large amount of water, as is the case with the succulent plants. The gemsbok and the eland, two species of antelope, are thus adapted to the sandy deserts they inhabit.—The amount of food required by animals depends upon its quality and their activity. A far less bulk of animal than vegetable food is required; and the greater the activity, the greater is the waste of the tissues, and the more nourishment is needed to repair them. The intervals of fasting are therefore determined mainly by this circumstance. While birds are eating most of the time when not asleep, reptiles pass months in succession without food, in the mean time being in a dormant state. And those of the mammalia which hibernate (as the dormouse, hedgehog, marmot, &c.) also pass the entire winter with little or no food. The sloth also has been known to suspend itself on a pole for 40 days without taking food. But irregularity of supply of food must also be taken into account. The griffin vulture will retain its vigor for five or six weeks without food; but when opportunity recurs it does not leave its repast for days, or so long as a morsel of flesh remains, so completely gorging itself that it is incapable of rising on the wing till it has ejected the contents of its crop. A total privation of food is longest endured without fatal consequences by animals manifesting the lowest vital energy. Fourteen persons, male and female, survived starvation on being shipwrecked for 23 days. An eagle lived 28 days, and several dogs 36 days without food. On the other hand, land tortoises have been kept alive 18 months and serpents for five years without food. The requirements of different animals in regard to their food will determine the limits on the globe within which each species will thrive; and this, together with the temperature required by each, is the principal agency determining the geographical distribution of the various species of the animal kingdom.—The greatest amount of strength and endurance is possessed by the warm-blooded animals; birds being the strongest of all animals in proportion to their size, except certain insects. The lion is capable of bearing off large animals, and has been known to leap over a broad ditch with a heifer in his mouth, and to break the back of a horse with a single stroke of his paw. The grisly bear, weighing 800 lbs., can drag the carcass of a buffalo weighing 1,000 lbs. to a considerable distance. The camel sometimes carries a weight of 1,000 lbs. 30 miles a day, and judges so accurately of its powers that, being accustomed to lie down while loaded, it refuses to rise till a part has been taken off, if too heavy a burden is imposed. The horse is about six times as strong as a man, his power being estimated at 420 lbs. at a dead pull. He cannot, however, carry more than three times as much weight up a steep hill. A Canadian shrew mole, whose body was but four inches long, being let loose in a room, passed between the legs of some heavy chairs and the wall with which they were in contact, throwing them aside without much apparent effort, and at last hid itself behind a pile of quarto books more than two feet high, which it also moved from the wall. This animal also burrows so quickly, that on being let loose in a yard it almost instantly disappears beneath the surface of the ground. On the other hand, the sloth is so averse to all effort that, when it has satisfied its appetite upon the fruits of trees, it falls to the ground to save itself the labor of descending.—As instances of fleetness of animals, the kangaroo, the hare, and the antelope may be alluded to. The first progresses by a rapid series of leaps, frequently of 20 feet, its own body being from 5 to 6 feet in length. The hare sometimes passes over 25 feet at a single bound. The springbok bounds to the height of 10 to 12 feet, clearing at each leap from 12 to 15 feet without any apparent exertion. Even the sheep in its wild state runs and leaps with great agility. The movements of the dolphin are also very rapid, and it leaps so high out of the water as sometimes to throw itself upon a ship's deck. The ostrich will at the outset outstrip the fleetest horse. The nandu (allied to the ostrich) is equally fleet, and when caught kicks so violently as to break even stones. The carrier pigeon flies 25 to 30 miles an hour. The dragoon pigeon has flown from Bury to London, 72 miles, in 2½ hours.

Spallanzani states that two swallows flew from Milan to Pavia, 18 miles, in 13 minutes. The precision and rapidity of muscular action of some animals is also remarkable. The elephant can pick up a pin with its huge trunk. The chamois goat leaps with the greatest precision from point to point on the mountain rocks, alighting on surfaces scarcely large enough for its feet to rest upon. A bird called the wryneck, having a long tongue like the woodpecker, darts forth and retracts this organ with such rapidity that the eye is unable to follow it. The frog also catches flies by movements scarcely less rapid.—No animal possesses more than five senses, and some are probably endowed with not more than one, the sense of touch. But we find each sense manifested in the animal scale, in all grades of perfection. Of intelligence, also, we find great varieties in birds and mammalia, while below the former we hardly find any higher attributes than mere instinct. This, indeed, predominates in most birds, and in the mammalia often assumes the appearance of cunning, artifice, or sagacity. The Egyptian ichneumon, being fond of poultry, feigns itself dead till the birds come within its reach, when it springs upon and strangles them, usually contenting itself with sucking their blood. There is a species of musk which also feigns death when caught in the noose set for it, but escapes the moment it is untied. The European cuckoo neither builds a nest for itself nor hatches its own eggs. It deposits a single egg in the nest of the hedge sparrow (and sometimes of the wagtail or the titlark), while the other bird is laying her eggs. This addition to her charge disturbs her arrangements, and during incubation she throws out her own eggs, or so disturbs as to addle them, to make room for the cuckoo's; but, according to Dr. Jenner's observations, she never displaces the latter. When some of her own eggs and that of the cuckoo are hatched, the young cuckoo manages to throw out the young sparrows and the remaining eggs, and thus gets the whole nest to itself. The ostrich surrounds her nest with a trench, in which she deposits some of her eggs as the first food of the young ones to be hatched from the eggs in the nest.—To an animal capable of being educated, though to a slight extent, we cannot deny the possession of intelligence; and judged by this criterion, most of the mammals and some birds must be regarded as possessing this attribute. The adaptation of means to ends, in entirely new circumstances, must also generally be attributed to it rather than to mere instinct. Swallows club together to repel a common enemy, many closing round a hawk. A martin being caught in a noose of packthread, fastened at the other end to a gutter, all the martins in the vicinity were attracted by its cries, and, striking the thread with their bills, succeeded in setting him at liberty. The superior intelligence of the elephant is often asserted; but this animal is really less intelligent than the dog, and about equal in this respect to the horse. As tested by educability, as well as by acquired tastes, the quadrumana are far the most intelligent of the lower animals.—Carnivorous animals are mostly solitary in their habits, while many of the herbivorous are socially inclined and gregarious. This is the case with the llama and the horse in the wild state. Camelopards herd together usually in companies of 16. Antelopes are found in herds of 2,000 or 3,000, or in small parties of only five or six individuals. The males also of antelopes and deer frequently consort together, independently of the females. On the other hand, the conjugal attachment of the stellerine (allied to the dugong) is so great that if the female be taken, the male will dash on shore to her in spite of blows, with the swiftness of an arrow. Some animals are docile and yielding, others obstinate. The mule is proverbial for the last attribute, but the llama is still more remarkable in this respect. Some animals are grave or morose, while others are playful, and even have their peculiar amusements. The mocking-bird amuses itself in frightening other small birds by imitating the screams of the sparrow hawk.—The particular classes and orders of animals will be described under the appropriate heads; the four classes of the vertebrata forming the articles AMPHIBIA, HERPETOLOGY, ICHTHYOLOGY, MAMMALIA, and ORNITHOLOGY; while the invertebrata will be found described under the heads ANIMALCULES, ARACHNIDA, ARTICULATA, CRUSTACEA, ECHINODERMA, ENTOMOLOGY, ENTOZOA, EPIZOA, MOLLUSCA, PROTOZOA, and RADIATA.

ANIMALCULES, a name familiarly applied to the more minute forms of animal life, for the knowledge of which we are mainly indebted to the microscope. Leeuwenhoek led the way in this as in most other branches of microscopic study; but it is to Gleichen that we are indebted for the first attempt at the systematic study of the subject. He was followed by the Danish microscopist O. F. Müller, who made the first regular classification of animalcules. Subsequent observation has detected many errors in the classification of Müller, and it has now little other than a historic interest. It is to Ehrenberg that we are indebted, directly or indirectly, for almost all our knowledge of these forms. Since the appearance of his work, *Die Infusionsthierchen*, the study of minute animal forms has been ably pursued by Dujardin in France, Siebold, Kölliker, and others in Germany, Owen in England, and Bailey in the United States.—The earlier observers grouped together, under the term animalcules, a vast variety of living beings having nothing in common except their minuteness of size. Plants and animals, mollusks, crustaceans, insects and worms, larvæ and perfect forms, all were aggregated together under the vague term animalcules. The labors of modern scientific men have been in great part exhausted in the distribution of this mass of animal and vegetable life among the various classes, families, and orders to which its heterogeneous materials properly belong, and the formation of a class to which the name *infusoria*, first proposed by Müller, is now generally applied. To this class we shall confine ourselves, and shall generally use the term infusoria, not that it is absolutely accurate, for though the greater number of these animals are developed in infusions, yet this rule is not without some striking exceptions.—If a drop of water in which animal or vegetable matter is decaying be placed upon the object-holder of a microscope of adequate magnifying power, say 200 diameters, it will be found to swarm with living beings in active and incessant motion. They vary in size from $\frac{1}{100}$ of an inch, when they are just within the limit of unassisted vision, to a minuteness which it tasks the power of the glass to detect. These are infusoria; they abound in every ditch, pond, lake, or river, are equally numerous in salt as in fresh water, have been found in thermal springs of high temperature, and in the melted snow of the Alps and the Andes; in short, wherever water and decaying vegetable or animal matter exist, these infusorial animals will be found in vast numbers. There is no doubt that they are often drawn up into the atmosphere in watery vapor, and borne to and fro by the winds. Many forms are not deprived of life by complete desiccation, and may therefore be mingled with the dust, and in this condition carried about by the winds, to resume their active vitality so soon as they chance to fall into water. The suddenness with which they appear in water, even distilled water, when exposed to the air, furnished the advocates of spontaneous generation with one of their strongest arguments.—Infusorial animalcules have neither vessels nor nerves, and are made up of a uniform tissue, called by Dujardin *sarcode*, and by Huxley *protoplasm*. This is in some classes of nearly uniform consistence; in others the external layer possesses considerably more density than the internal, while in yet others a distinct pellicle or skin can be made out. They have no true feet; a few of the very lowest type have the power of protruding portions of their homogeneous structure in the form of limbs, which they use both for the prehension of their food and for locomotion. In the higher forms the locomotion is by cilia, or very minute hairs. This motion is probably automatic, as it is constant day and night, the animal never sleeping, nor appearing to take rest. Yet it certainly has in some cases many of the characteristics of spontaneity, the animal in his rapid course seeming to avoid obstacles; but the subject of the character of the locomotion of these animals is very obscure. Some of these higher forms have a shell or outer coat, called carapace or lorica; these are spoken of as loricated.—We have already intimated that the systematic classification of the infusoria has been a matter of great difficulty. That of Ehrenberg, to which we shall in the main conform, though possessing great merit, has also very great defects. He includes among his infusorial animals very many large and important families which are now known to belong to the vegetable kingdom. His *desmidieæ* are now very generally, we might almost say universally, admitted to be *algæ;* and his *diatomaceæ* are now also placed in the vegetable kingdom. The classification of Dujardin, though it has some great advantages over that of Ehrenberg, is deformed by a multitude of new terms, or, what is worse, old terms to which he affixes new significations. The two great obstacles which at present forbid even the hope of success in any attempt at systematic classification of infusoria are: 1, the great difficulty of distinguishing the lower forms of animal from the corresponding forms of vegetable life; 2, that of deciding whether a given form is permanent, or whether we have to do with the larvæ of an insect, or some one of those forms which crustaceans, polyps, and other of the lower animals assume in the progress of their alternations of generation. A motion apparently spontaneous was formerly supposed to decide the question in favor of an animal nature; but Vaucher of Geneva (1790) proved that a motion not to be distinguished from the spontaneous movements of animals is common in the spores of the simpler aquatic plants, and is indeed nature's provision for their dispersion. That animals absorb oxygen and give out carbon, while plants give out oxygen and absorb carbon, affords in the opinion of many naturalists the desired test. But although this is a very general, it is not found to be a uniform law. A third distinctive mark, and probably the most useful, is found in the character of their nutritive material—plants being nourished by inorganic, animals by organic food. There are some exceptions to this rule also, but they are not numerous, nor do they greatly detract from its practical value. Agassiz has satisfied himself that very many of Ehrenberg's genera are germs of aquatic worms, and he suggests that this is probably the true nature of all the infusoria. Should this idea prove well founded, the most essential changes will of course be necessary in the arrangement of the infusoria—if, indeed, it is not found necessary to break up this class altogether, and distribute the individuals of which it is composed throughout the lower divisions of the animal scale. But meanwhile we shall adopt the classification of Ehrenberg, eliminating from it those families on whose vegetable nature the great mass of naturalists are agreed. Ehrenberg divides the infusoria into *polygastrica* and *rotatoria*. The characteristic of the former is the appearance of certain internal cavities, which he supposed to be dilated portions of the alimentary canal, or stomachs; hence their name polygastric, or many-stomached. The rotifera, the so-called wheel animalcules, are distinguished by a peculiar arrangement of cilia upon lobes near the mouth, which, when in a state of active vibration, give to the lobes the appearance of wheels in rapid motion. These so-called wheel animalcules are, however, so widely different in their plan of structure, and so much higher in their degree of organization than the polygastrica, that naturalists have very generally separated them from the infusoria, and have placed them among the eutromostracan crustaceans. We shall, however, treat of both in the present article. I. Polygastric Infusoria. It is unfortunate that the name polygastric, or many-stomached, is taken from a supposed peculiarity of the animal, the existence of which in any of the class has been rendered by later researches more than doubtful, and the absence of which in some families is admitted by Ehrenberg himself. By retaining this name, we commit two verbal inconsistencies: 1, in calling animals many-stomached which have probably no stomach at all; and 2, we form a subdivision of these polygastrica, the characteristic of which is the absence of any digestive tube. Following Ehrenberg, then, we base the first great division of the polygastric infusoria on the presence or absence of an alimentary canal. Those in which it does not exist he calls *anentera;* those in which it does, *enterodela.* Of the *anentera*, some have the power of protruding a portion of their homogeneous bodies as a foot-like process; and of these some have a shell, or, in scientific phrase, are loricated, others are non-loricated. The former are called *arcellina*, the later *amœbæ.* Of the remainder, some are furnished with cilia, others are not. To the former the term *dinobryina* is applied when they are loricated, and *astasiæa* when they are not. The non-ciliated, in like manner, are called *peridina* when loricated, and *cyclidina* when naked. The *enterodela*, or polygastrica having a digestive canal, are divided in the same way into two parallel series, as they have or have not a lorica or shell. First in this parallel series are placed those where the orifice of the digestive tube is single; these are *vorticellina* and *ophrydina.* Next come those with two orifices at opposite ends of the body; these are *enchelia* and *colepina.* Next are those where the two orifices are irregularly placed, the *aspidiscina* having no shell, the *trachelina* and *ophryocercina* each having a shell; the former having a proboscis but no tail, the latter a tail and mouth anterior. Lastly, those having two ventral orifices: the *euplota*, where the shell is present, and the *kolpoda* and *oxytrichina*, the former moving by cilia, the latter by other organs, neither having a shell. A diagram will perhaps make this classification more intelligible:

POLYGASTRIC ANIMALS.

Anentera, *having no digestive tube.*

	Loricated.	Non-loricated.
A. Protruding part of the body like feet.	Arcellina.	Amœbæ.
B. Having cilia.	Dinobryina.	Astasiæa.
C. Non-ciliated.	Peridina.	Cyclidina.

Enterodela, *having a digestive tube.*

A. One orifice to the digestive tube.	Vorticellina.	Ophrydina.
B. Two orifices at opposite ends of the body.	Enchelia.	Colepina.
C. Two orifices irregularly placed.	Trachelina, a proboscis but no tail. Ophryocercina a tail and an anterior mouth.	Aspidiscina.
D. Two ventral orifices.	Euplota.	Kolpoda, moving by cilia. Oxytrichina, moving by other organs.

—As to structure, we have already stated that neither nerves nor vessels have been discovered in infusoria; indeed, in the very lowest class, the *amœbæ* and *arcellina*, which are by Dujardin called *rhizopoda*, and by other writers *pseudopoda*, we find life manifesting itself almost without organization. The *amœba* is a jelly-like mass, without determinate shape, in texture nearly uniform, having no integument; in fact, only differing from a mass of jelly in being slightly more fluid in the centre than at the circumference, and having at some point near its surface a vesicle, perhaps only a vacuole, which pulsates pretty regularly. When this creature is about to move, a current of the more fluid central portion is seen tending toward some one point of the circumference; soon a portion of the mass protrudes, it elongates till perhaps double the length of the animal, the mass of whose body then seems to pass into the protruded and elongated portion, and thus locomotion is effected. The mode of taking food is thus described by Kölliker, who studied it in the *actinophrys*, a genus closely allied to the *amœba*, and like it made up of a mass of jelly, portions of which, scarcely differing from the general mass in structure, are protruded in the form of rays: "The mode in which the actinophrys is nourished is one of the highest and most special interest. Although the creature has neither mouth nor stomach, yet it takes in solid nutriment, and rejects what is indigestible. This miracle, for so it may almost be called, is thus effected: When in its progress through the water the actinophrys approaches any small plant or animal—a minute crustacean, rotifera, the young of cyclops, or the lower *algæ diatomaceæ* for instance—as soon as the mass is touched by one of the rays of the actinophrys, it seems to adhere to it; the ray now slowly shortens itself, and draws its prey to the surface of its own body; the surrounding filaments attach themselves to it, bending their points together, and closing over it till it is enclosed on all sides. Gradually a cup-like cavity is formed in the body of the actinophrys, at the base of the ray, and into this the prey is crowded, till, the cavity still growing deeper, the whole mass comes to be imbedded in the very substance of the animal, which gradually closes around and over it, and thus the mass comes to be contained in a cavity or stomach formed for its reception. Here it is digested, and its nutritive portions absorbed; and when this is accomplished, the undigested portion, if any such remain, is protruded toward the surface, and finally emerges from the body of the animal as it might from a mass of jelly; the opening by which it escaped closes behind it, and the animal resumes its pristine form and condition." Of the mode of reproduction in these animals, we only know they multiply by self-division, and that when portions of the mass are cut or torn away, these maintain an independent existence, and soon acquire the shape and functions of mature animals. Of their proper sexual reproduction we know nothing, although all analogy leads us to suppose that this multiplication by division, whether spontaneous or artificial, must have its limit, and a proper sexual reproduction by germ and sperm cells be interposed.—Ascending in the scale, we come to those polygastric infusoria which have a proper digestive canal—the *enterodela* of Ehrenberg. Though the existence of an alimentary canal is made the characteristic of this group, its presence in any of the genera is by no means certain. All have beyond controversy a mouth into which food is taken, and many have an anal orifice from which excrement is discharged; but whether there is any canal with definite walls through which the food passes, as in the higher animals, is doubted by many naturalists, and denied by not a few. Ehrenberg indeed traced the course of the canal passing very nearly straight in the length of the animal's body in some genera, convoluted in others, and in a third class winding in a spiral around the inner surface of the body, with flask-like appendices communicating with its cavity, and making up the great mass of the body. But the disciples of Ehrenberg, working with the best modern improved microscopes, have not been able to satisfy themselves of the existence of this so-called digestive tube. A mouth and a short, generally ciliated œsophagus, these animals certainly have; but the existence of an alimentary canal, beyond this short gullet, is very doubtful. The infusoria of this class differ from the *amœbæ* and other *rhizopoda*, in that they have a true investing membrane or skin, which in some families can be detached as an independent membrane; and from the internal surface of this membrane partitions are sent off, which divide the general cavity of the body into separate chambers. In these the jelly-like tissue of the animal, the *sarcode* of Dujardin, is lodged; and into these chambers the food, when it has escaped from the œsophagus, is received; it passes from one to the other till it has made the circuit of the body, not, however, with much regularity, and is in its course digested; and all of its alimentary substance being absorbed, the residue is ejected either by the mouth or by an anal orifice. Thus is the function of digestion performed in the *enterodela*.—It was stated in the definition of the infusoria, that they have no nerves or blood vessels. Nervous matter has certainly never been detected in any of the class; and although Ehrenberg supposed that two colored (generally red) spots, which are found pretty constantly near the anterior part of the body, are eyes, yet, as he was equally confident of the existence and nature of these spots in some forms which undoubtedly belong to the vegetable kingdom, it is probable that he was in error as to these. In most polygastric infusoria, small vessels which appear to contain a clear, nearly colorless fluid, are found, which enlarge when full, and when empty contract so as to be scarcely visible. Their number varies from a single one to ten or twelve; they usually occupy the same place in individuals of the same species, and their contents seem sometimes to be propelled from one to the other. They are probably receptacles of nutrient fluid stored up for the use of the system. Another remarkable peculiarity of the infusoria is, that in the very substance of their bodies may generally be found a solid granular-looking mass of very variable form—round, oval, curved, or even in some cases branched—by some called the nucleus. By Ehrenberg it was said to be a testis; and although this opinion has found little favor with the more recent observers, yet that this peculiar mass has a very important connection with the reproductive function cannot be denied. When the infusoria are about to multiply by self-division, the separation always begins in the nucleus. May not this be a mass of germ cells, such as we see in those insects which, after one sexual connection, continue throughout a succession of generations to bring forth young, till the mass of germ cells is exhausted, and a second sexual act is necessary to continue the multiplication of the species? In none of the infusoria has any muscular or contractile tissue been found, though the very lowest form, the *amœbæ*, possess the function in an eminent degree. Here, as ever in the animal scale, function precedes organization; and the function of muscular contractility is manifested while there is as yet no appearance of muscular tissue. The stalk of the *vorticella* forms a notable illustration of this rule, as it possesses contractility in a remarkable degree, yet no muscular tissue is to be found in it.—Reproduction is effected in different ways in the different forms; the mode which has been best studied is that by spontaneous self-division. This is sometimes longitudinal, sometimes transverse. As before stated, it begins in the nucleus, and this body is often completely divided while the line of future separation has scarcely begun to appear on the surface of the animal. These subdivisions are completed in so short a time, that Ehrenberg has calculated that no fewer than 268,000,000 may be produced in the space of one month from a single individual. Another mode in which new individuals are formed is by what is called conjugation. Two individuals attach themselves together, till at length their entire bodies coalesce and form one, in the interior of which a new individual is formed, and in process of time discharged from the parent body, either by splitting or through some orifice. Yet another mode of reproduction has been observed by Stein and other microscopists. It has been called the encysting process; and although it has been studied in relation to but few forms, yet the facts already established render it very probable that many, if not indeed all the infusoria multiply by this or some closely allied process. An infusory animal about to become encysted secretes from the surface of its body a thick glutinous substance, which, gradually hardening, forms a firm case in which the animal is shut up, but not so closely as to prevent tolerably free motion. A change now takes place in the animal itself; the cilia upon its surface are retracted, and the body assumes a pretty regular circular outline; then either the whole body, or the nucleus only, breaks up into many small fragments, each of which assumes an independent life, and moves freely in the parent organism; this mother-cell now bursts and is disintegrated, while the young brood swim forth either in the form of the parent, or in some transition shape, from which, through one or more changes, they pass into the permanent type identical with the parent organization. II. ROTIFERA OR WHEEL ANIMALCULES. These have little in common with the order of infusoria of which we have spoken, being both more highly organized and formed on a different plan. Even in respect to size they differ, being generally much larger, some having a length of half a line, and many being within the limit of unassisted vision. By many naturalists they are classed with the articulated animals, under the term of cilio-articulates. Their name, as we have already stated, is derived from a particular and very curious arrangement of the cilia covering two lobes near the anterior extremity, which when in motion have exactly the appearance of two minute wheels rotating very rapidly. But this, though a striking peculiarity of many rotifers, is not common to them all. In some the cilia about the head are arranged in a wavy line. The rotifera may be defined as minute worm-like animals, very transparent, without legs, having the anterior portion of the body furnished with certain retractile lobes, the margins of which are covered with cilia, the alimentary canal distinct and having two orifices, the mouth having a true dental apparatus, the reproduction by ova only. They are aquatic, though a few species can exist in moist earth. They are found alike in salt and fresh water, but rarely in that which is rendered foul by decaying vegetable and animal matter, and which swarms with the polygastric animalcules. It is only when these have devoured the decaying matter that the rotifer appears to feed upon them. Rotifera have great tenacity of life, and are not destroyed by complete and long-continued desiccation. Individuals have been kept in vacuo with sulphuric acid and chloride of lime, insuring the utmost possible amount of dryness, for a month, and yet revived on being placed in water. The rotifera have always two investing membranes, both transparent, and the inner always flexible; the outer is in many quite firm, constituting a horn-like tube, from which the head and tail of the animal protrude. It never contains either lime or silica, which is probably the reason why no traces of these animal forms are found in any fossiliferous rocks. Their bodies are retractile, and many creep like worms. They swim by means of their cilia very rapidly. Near the tail is, in most forms, either a dirk-like or claw-like process, by which the animal can attach itself. The gullet is furnished at its inferior portion with a masticating apparatus consisting of two strong semicircular jaws, each furnished with from one to five teeth, which appear to contain mineral matter. The stomach is either globular or tubular, and scarcely distinguishable from the intestine below. Near the anus the intestine is enlarged into a sort of cloaca with which the genital apparatus communicates. Several small glandiform bodies are observed near the alimentary canal, and some undoubtedly communicate with its cavity. It is a curious fact that, though the digestive apparatus is in most of these animals much more fully developed than any other, yet in one genus described by Mr. Dalrymple ("Philosophical Transactions," 1849, p. 339), no anal orifice was found, and indeed scarcely any intestinal canal; so that the excrementitious food must have been ejected from the mouth, as in some of the very low polygastric forms.—We now come to locomotion. Several distinct longitudinal bands of a highly contractile tissue pass the entire length of the animal, and certain transverse bands have probably the same power. It is, however, very doubtful whether any true muscular tissue, with the characteristics by which we identify it in the higher animals, exists in these animalcules. The same remark applies to the nervous system. The function is certainly performed; but whether the cords and masses which Ehrenberg describes as nerves and ganglia really have that character, is at least uncertain. Two red spots near the head are supposed on pretty strong evidence to be eyes, or at least rudimentary forms of the organ of vision. There is no proper circulatory apparatus, but water is very freely admitted into the body, and probably serves to aërate the tissues. It is kept in motion by cilia lining the tubes into which it is received.—*Reproduction.* All that is certainly known upon this subject is that the rotifera multiply by true ova, and never by gemming, budding, or spontaneous splitting, like the polygastrica. Until recently they were generally supposed to be hermaphrodite, but some late observers believe them to be unisexual. Ovaries are made out without difficulty, and in the vast majority of individuals; but spermatozoa have been found in only a very few, perhaps only one species. If males exist as a separate sex, they are probably only developed at one period of the year, and their term of existence is very short. This is rendered probable by a very curious observation made by Mr. Dalrymple. He found in one genus male individuals, that possessed neither mandibles, nor alimentary canal, nor glands. The only apparatus that was fully developed was the generative. The animal was in fact a mere male genital system, endowed with power of independent existence, though that existence must have been of very short duration. The transparency of the tissues enables us to trace very satisfactorily the formation and progress of the ova. Their growth is very rapid, and they are in some genera extruded from the ovary two or three hours after their germ is first detected, and hatch in less than half a day. In other families the eggs remain in the ovary or cloaca, and are there hatched, the young being born alive. From the transparency of all the tissues, it is often possible to trace the form, and to a certain extent make out the details of the structure of the young animal while it is yet in the body of the parent.

ANIMAL ELECTRICITY, electricity produced in the bodies of animals. Of this electricity there are two kinds, the dynamical or galvanic and the statical. I. *The production of dynamic electricity.* Few discoveries in science have more importance than the almost accidental observation made by Luigi Galvani in 1786. After having examined the influence of the shock produced by a spark of the electrical machine on a frog's leg, Galvani observed a new and very curious phenomenon. He had skinned a frog, taking away its two legs with a part of the spine, and attached the whole to a copper hook which he had hung upon an iron railing near his laboratory. He stood watching to see if the electricity of the atmosphere would produce upon these legs the same effect as an electrical machine. After some time, having observed no sign of electrical influence, he decided to remove the frog's limbs, and while doing so he perceived the very muscular contraction which he had been vainly expecting to see produced by atmospheric electricity. He soon discovered the condition of this contraction, which was the contact of the moist limbs of the frog with the iron rail. Having substituted for the copper hook and iron rail a metallic arc composed of pieces of these two metals, he found that he could produce the contraction at will. For the production of sudden muscular contraction and of a movement of the limb, it was only necessary to place one end of the arc in contact with a nerve or with the spinal canal, from which the nerves emerge, and with the other end one of the muscles of the leg. Galvani first published these experiments in 1791, in his celebrated work, *De Viribus Electricitatis in Motu Musculari Commentarius.* According to the theory proposed in this work, the muscles chiefly contain the animal electricity which manifested itself in the above experiments, and which he thought was supplied by the nerves and the blood. When the discoveries of Galvani became known, the whole civilized world was seized with admiration, and the curiosity to witness his experiments became universal. Du Bois-Reymond says: "Wherever frogs were to be found, and where two different kinds of metal could be procured, everybody was anxious to see the mangled limbs of frogs brought to life in this wonderful way. The physiologists believed that at length they should realize their visions of a vital power. The physicians, whom Galvani had somewhat thoughtlessly led on with attempts to explain all kinds of nervous diseases, as sciatica, tetanus, and epilepsy, began to believe that no cure was impossible." Volta soon opposed the views of Galvani, and maintained that the pretended animal electricity was nothing but the electricity developed by the contact of two different metals. Galvani replied that with one metal only the muscular contraction was produced, although very feebly. Volta answered that the metals employed were not pure, and that as they had no homogeneity they acted like two metals. He showed that even the least physical alteration of a part of an arc of one metal was sufficient to make it act as if it were composed of two metals. Galvani, however, succeeded in producing contractions without the intervention of any metal whatever, by merely applying the nerve of a leg on the muscles or establishing a communication between the muscles and the nerve by a piece of moist animal tissue. Alexander von Humboldt took sides with Galvani against Volta. In employing very irritable frogs he found that there were strong muscular contractions in the following circumstances: 1, when the leg of a frog was bent back against the ischiatic nerve, both parts being still originally connected; 2, when the crural nerve and its muscles were connected by a fragment cut from the same nerve; 3, when a connection was established between two parts of the same nerve by means of some animal tissue. In 1798 Galvani died, and the next year Volta discovered the pile; and, as it has been said, he then earned the right of exclaiming, with triumphant scorn, "I don't need your frog; give me two metals and a moist rag, and I will produce your animal electricity. Your frog is nothing but a moist conductor, and in this respect it is inferior to my wet rag." For nearly 30 years the supporters of the theory of animal electricity were silenced by the great discovery of Volta.—In 1825 Nobili, having rendered extremely sensitive the galvanometer (instrument for the measuring of galvanic currents), thought that the current which produces muscular contractions in the frog's legs might be detected by his instrument. He failed in his first attempt, the contractions taking place while the needle of his instrument stood still; but after having improved the instrument he succeeded in obtaining a notable deflection of the needle. Unfortunately for the progress of science, Nobili admitted that the current formed in muscles was due to a difference of temperature between the nerves and the muscles. Nevertheless, he left to his successors some facts of great importance, the most interesting of which is that when the legs of several frogs are disposed in such a way that the nerves of one touch the muscles of another, this kind of pile increases in power with the number of legs.—To Prof. Carlo Matteucci belongs the merit of having positively proved the production of galvanic currents in muscles. His researches, those of Du Bois-Reymond, of Donné, of Baxter, of Brown-Séquard, of Eckard, and others, have established beyond doubt that a production of electricity is constantly going on in all the tissues of the living animal economy. The following facts, among others, have been well demonstrated: 1. When the electrodes or conductors of a galvanometer are applied one on one surface, and the other on another surface, of the animal body, a current takes place which moves the needle of the instrument. Thus Donné found a current between the skin and most of the internal membranes; thus Matteucci ascertained that there are different electrical states in the liver and the stomach; and thus also Baxter found a current between the internal surface of an intestinal vein and any part of the mucous membrane of the bowels. 2. There are electrical currents in muscles and nerves, as we will show hereafter. 3. All the organs of the body yield electrical currents when they have been divided, and when their normal surface and the surface of the section are in communication with the electrodes of a galvanometer.—No one has been more successful than Du Bois-Reymond in experimenting upon the production of galvanic or electrical currents in the various parts of the body. He owes his success in a great measure to his galvanometer, which admirable instrument, made by himself, is so sensitive that the exceedingly weak current from two parts of the skin, even very near each other, is felt by it. The wire wound upon the frame of this apparatus is 5,584 yards or more than 3 miles long; it forms 24,160 coils around the frame. However, it is not necessary to employ such a powerful instrument to prove the existence of animal electricity, and the ordinary galvanometers may answer the purpose. Before the researches of Du Bois-Reymond it was admitted that there were two kinds of muscular currents, one belonging to divided muscles and the other to undivided muscles. The first had been very well observed by Matteucci, who ascertained that it is constantly directed from the interior of the muscles to its surface. It exists in the muscles of all the animals which have been examined, and Brown-Séquard has found it in man. As to the other current, that of undivided muscles, it is what Nobili called the proper current of the frog. Du Bois-Reymond found that this current exists also in the higher animals, and that its direction varies extremely according to many circumstances. In the limb of the frog this current is directed from the tendon of the principal muscles to their surface. If in certain animals the current seems to be weak, although it may be in reality strong, it is because in some muscles the tendon is placed at one extremity and in others at the other, and that sometimes there are two tendons.—The galvanic current of muscles gradually diminishes after the death of animals, or after the separation of the muscles from the living body. According to the researches of Du Bois-Reymond, and numerous experiments made by Brown-Séquard, the laws regulating the diminution and the disposition of the muscular current are the same as those of muscular irritability. Between these two physiologists, however, there is this difference, that Du Bois-Reymond thinks that the cessation of the current takes place at the time a supposed coagulation of the fibrinous liquid of the muscles occurs, producing the so-called cadaveric rigidity; while Brown-Séquard has shown that there is no such thing as this coagulation where cadaveric rigidity supervenes. The latter physiologist has discovered that the muscular current, after having completely disappeared (cadaveric rigidity being fully established), may be reproduced, together with the muscular irritability, when an injection of blood charged with oxygen is made into the arteries of a limb. This experiment he has performed not only on animals, but on the limbs of guillotined men. He found that the more oxygen there is in the blood employed, the quicker the muscular current and irritability return. This fact, with many others discovered by Matteucci and Du Bois-Reymond, shows that the production of the current depends on the nutrition of the muscles, and particularly on the oxidation of their tissues. Prof. Matteucci published many facts to prove that the muscular current is independent of the nervous system; but his experiments are all open to objections. More decisive researches have been made by Brown-Séquard, who has ascertained that in muscles whose nerves have completely and definitively lost their vital properties, currents not only exist during life, but may be reproduced by the influence of injections of oxygenated blood when they have disappeared after death.—Du Bois-Reymond has established as a law that every point in the natural or artificial longitudinal surface of a muscle is positive in relation to every part of its transverse surface, whether natural or artificial; and as the tendons, which are conductors, are in communication with the natural transverse surface, it follows that they are negative as regards this surface. This law signifies that the longitudinal surface of a muscle acts like the positive pole of a pile or galvanic battery, while the transverse surface acts like the negative pole. According to this important law, when any point of the longitudinal section of a muscle is connected by a conductor with any point of the transverse section, an electric current is established, which is directed in the muscle from the transverse to the longitudinal section. Du Bois-Reymond has discovered that the smallest part of a muscle acts in the same way as the whole of it, except that the strength of the current is less and less powerful as the part is smaller. Each elementary bundle of fibrils in a muscle seems to be like a couple in a galvanic battery, except that the couples represented by these elementary bundles are not able to transmit their current so freely as the couples of a real galvanic battery usually are. Du Bois-Reymond has found that the amount of electricity generated in muscles must be excessively great; but as it is impossible to make an aggregation of all the elementary currents existing in a muscle, we have not a real measure of the quantity of electricity produced in these organs.—We owe to Matteucci the discovery of one of the most important facts concerning animal electricity. He found that when a muscle contracts, if there is a nerve placed upon it leading to another muscle, the latter contracts also. The contraction of this second muscle Matteucci calls induced. To facilitate the understanding of what we have to say on this subject, we will call not only this secondary contraction induced, but also the muscle that exhibits it, and we will call the first contraction and the muscle in which it takes place inducing. Matteucci had a great deal of trouble in trying to explain this induced or secondary contraction; his latest view was that it results from a galvanic discharge from the inducing muscle on the nerve of the induced one. Du Bois-Reymond, who has carefully examined the circumstances of this fact, explains it otherwise. He supposes that the current of the inducing muscle passes through the nerve of the induced one, and that when the inducing muscle is set in contraction, the current diminishes, and, as any diminution of a continuous current passing through a nerve is a cause of contraction for the muscle which it animates, it results that the induced muscle contracts. It is known that when a continuous current passes through a nerve there is a contraction in the muscle which it enters in the beginning of the passage and on its cessation, and also when there is any change in its strength. It is to this last condition that the induced contraction is attributed by Du Bois-Reymond, but, if he were right, there should be a contraction in the induced muscle at the time we put its nerve on the inducing one, and also at the time we take it away; but unfortunately for the theory, there is no contraction in these cases, except in peculiar circumstances. We must therefore consider the theory of the distinguished German physiologist as not sufficiently grounded.—Whatever may be the cause of the irritation of the nerve of the induced muscle, it is certain that when the inducing one contracts this motor nerve is irritated; the same thing takes place, as Matteucci and Brown-Séquard observe, when an excitor or a sensitive nerve instead of a motor is placed upon the inducing muscle; the irritation then causes either a reflex movement or a pain. Brown-Séquard has been led by many experiments to conclude that the irritation of sensitive nerves by the contraction of inducing muscles has a great share in many important physiological and pathological phenomena. Every one knows that, except when we look at the parts of our body which we move voluntarily, we direct our movements almost entirely according to the sensations that we receive from our contracting muscles. These sensations have been shown by this physiologist to be chiefly due to the induced irritation of the sensitive nerves at the time the muscles contract. The muscular sense of Sir Charles Bell, or the guiding sensations of Prof. Carpenter, are thus obtained, and so it is with the measure of the distance of objects when looked at with both eyes; the state of our ocular muscles teaches us the distance, and they do it by the irritation they induce in nerves while contracting. According to Brown-Séquard, the pain of cramps, that of the contractions of the uterus in parturition, that of the spasm of the sphincters, &c., depends upon an excessive induced irritation of the sensitive nerves in consequence of muscular contractions. Among the other proofs adduced by him in support of his view that muscular contractions, normal or pathological, induce irritations in their sensitive nerve fibres, probably by a galvanic discharge, and exactly as an inducing muscle irritates a motor nerve placed upon it, the following are the most important: He has found that it is electrically just the same thing for the intensity of the irritation of the motor nerve lying upon an inducing muscle, and for the intensity of pain in a case of spasm of the sphincter of the anus, and in a case of contraction of the anterior muscles of the thigh. In these three circumstances, viz., the experiment with the motor nerve, and the two pathological cases in man, we observe: 1, that there is no irritation or no pain if the inducing muscle has no resistance to overcome when it contracts (it is so after the section of the muscle or of its tendon); 2, that the irritation or the pain increases when the inducing muscle is extended. The known facts that the pain due to the spasm of the sphincter of the anus disappears when it is divided, and that the section of a tendon of a contracted muscle causes the cessation of pain, had not hitherto received any explanation. The researches of Brown-Séquard render now very easy the understanding of the mode in which these facts are produced.—With the help of his very sensitive galvanometer, Du Bois-Reymond has been able to prove that the galvanic currents of muscles in man may be rendered evident during a voluntary movement. If the two electrodes of the galvanometer are in communication, one with one hand and the other with the other hand of a man, and if a voluntary movement is made by one of the arms, there is at once a deviation of the needle of the instrument, indicating the passage of a galvanic current. According to the discoverer of this important fact, at the time of the contraction of the muscles of one arm, the current which existed there, and which was neutralized by a current of equal strength in the other arm, becomes diminished, and therefore the surplus of the other passes out and deflects the needle of the instrument.—Du Bois-Reymond has discovered that nerves are, like muscles, able to afford galvanic currents. The principal law concerning these currents is the same as that of the muscular currents. The direction of the galvanic current of the nerves is from their interior to their exterior, just as it is with the muscles. From all his experiments on the electro-motive power of muscles and nerves, the following conclusions may be drawn: 1. The muscles and nerves, including the brain and the spinal cord, are endowed during life with an electro-motive power. 2. This electro-motive power acts according to a definite law, which is the same in the nerves and muscles, and may be briefly stated as the law of the antagonism of the longitudinal and transverse section; the longitudinal surface being positive, and the transverse section negative. 3. As the nerves have no natural transverse section, their electro-motive power when they are in a state of rest cannot be made apparent unless they have previously been divided. 4. The muscles, having two natural transverse sections, may show their electro-motive power without being divided. However, the electro-motive power of the undissected muscles is often more or less concealed by the contrary action of a layer situated on the natural transverse section, which Du Bois-Reymond calls the parelectronomic layer. The contrary electro-motive power of this layer may be increased by cooling the animal. 5. Every minute particle of the nerves and muscles acts according to the same law as the whole nerve or muscle. 6. The currents which the nerves and muscles produce in circuits of which they form a part, must be considered only as derived portions of incomparably more intense currents circulating in the interior of the nerves and muscles around their ultimate particles. 7. The electro-motive power lasts after death, or, in dissected nerves and muscles, after separation from the body of the animal, as long as the excitability of the nervous and muscular fibres; whether these fibres are permitted to die gradually from the cessation of the conditions necessary to the support of life, or whether they are suddenly deprived of their vital properties, by heat, chemical means, &c. 8. We may add that, according to Brown-Séquard, the electro-motive power, at least in muscles, after it has disappeared naturally after death, may be reproduced with the other vital properties by the influence of injections of oxygenated blood. 9. In the different contractile tissues the electro-motive power is always proportioned to the mechanical power of the tissue. 10. Other animal tissues may produce electro-motive action; but it is neither so strong as the action of the nerves and muscles, nor so regular; nor does it vanish with the vital properties of the tissues; nor does it, lastly, undergo those sudden variations of intensity and direction, which may be thus briefly stated: 11. The galvanic current in muscles when in the act of contraction, and in nerves when conveying motion or sensation, undergoes a sudden and great diminution of its intensity. (We have said above that there is some reason to doubt the accuracy of this law as regards muscles.) 12. Muscles inactive from the contrary action of the parelectronomic layer, when contracting, become active in the opposite direction to that which muscles in a state of rest exhibit. Hence it must be concluded that the electro-motive force of the parelectronomic layer remains constant in the act of contraction. 13. If any part of a nerve is submitted to the action of a permanent current, the nerve in its whole extent suddenly undergoes a material change in its internal constitution, which disappears on breaking the circuit as suddenly as it came on. 14. The electrical phenomena of motor and sensitive nerves are identical. Both classes of nerves transmit irritation in both directions. We will merely say in addition to these laws, that, in examining who was right between Galvani and Volta, we find that they were both in some points right, and in some others wrong. Galvani was right in saying that there is an animal electricity, and Volta was right in looking at the heterogeneity of metals as a source of electricity; and had he extended his views to the living tissues, he would have found that there also, as in metals, where there are two heterogenic particles in contact one with the other, a galvanic current is generated. II. *The production of static electricity in animals.* A constant production of this kind of electricity cannot be doubted; but animals and men being in free communication with the earth, it is rarely possible to ascertain the presence of this electricity. But when the body of a man is insulated he may affect the electrometer. If two men are insulated, as it often occurs that they are charged with different electricities, there is when they touch each other a peculiar crackling, and sometimes a spark, announcing the combination of the vitreous and the resinous electricity. In dry weather many persons may hear the sound and see the light resulting from a combination, when they suddenly pull off the articles of dress in contact with their skin. Dr. Schneider mentions a Capuchin friar who, on removing his cowl, used to perceive a number of shining, crackling sparks passing from his scalp. But it is in the United States that the most interesting fact concerning the production of static electricity has been observed. It was in a lady, who for many months was in an electrical state so different from that of surrounding bodies, that, whenever she was but slightly insulated by a carpet or other non-conducting medium, sparks would pass between her person and any object she approached; when she was most favorably circumstanced, four sparks per minute would pass from her finger to the brass ball of the stove at the distance of 1½ inch. Sometimes the electricity thus developed is sufficient to light the gas from an ordinary burner. From the pain which accompanied the passage of the sparks, the lady's condition was a source of much discomfort to her. The circumstances which appeared most favorable to the production of electricity were an atmosphere of 80° F., tranquillity of mind, and social enjoyment; while a low temperature and depressing emotions diminished it in a corresponding degree. The phenomenon was first noticed during the occurrence of an aurora borealis; and though its appearance was sudden, its departure was gradual. Articles of dress had no influence upon its intensity.

ANIMAL HEAT, the heat produced in the interior of animal bodies by the nutritive changes going on in the blood and the tissues. Living animals, as a general rule, if not invariably, have the power of generating heat within their own bodies. The proof of this is, that in many of them the temperature of the body is habitually above that of the surrounding atmosphere or water in which they live. Thus the temperature of the porpoise has been found to be 99·5° F., and that of the seal 104°. The temperature of the human body, and that of the quadrupeds generally, is about 100°; while that of many of the birds is 105°, 110°, or even 111°. As this temperature is maintained at or about the same standard, though that of the external atmosphere may be much lower, and as the animal is consequently losing heat incessantly by radiation and conduction, it is evident that there is a constant supply from an internal source by which the external loss is made good. In man and in all the higher animals, namely, birds and mammals, this internal heat is very active; so much so that their higher temperature is easily distinguished both by the touch and the thermometer, and is kept at almost a uniform standard whatever may be the external variations. These are therefore called the warm-blooded animals. In reptiles and fishes, on the other hand, the production of heat is less active; their temperature is habitually lower than our own, so that they feel cool to the touch; and it varies so little from that of the surrounding media that greater care is requisite to distinguish it, even by the thermometer. They are accordingly distinguished as the cold-blooded animals. Animal heat is generated, however, even in these species, as is demonstrated by exact observation. Thus the temperature of a frog has been found to be 48° when immersed in water at 44·4°; that of a serpent 88·4°, in air at 81·5°; that of a tortoise 84°, in air at 79·5°; and that of a fish from 1·7° to 2·5° above that of the surrounding water. In the invertebrate animals, the appreciation of their temperature by the thermometer has been found more difficult, since, on account of their small size, the radiating external surface is greater in proportion to the mass of heat-producing tissue within; and the heat thus generated is almost as rapidly dissipated. This difficulty, however, has been overcome in the case of insects by experimenting upon a large number collected in a small space. Thus Mr. Newport found that when the temperature of the external atmosphere was 34·5°, that of the interior of a hive of bees was 48·5°; and that if the insects were thrown into a state of active excitement by rapping on the hive, it would rise to 102°.—The heat thus produced in the interior of the body is not exactly the same in degree in every part. It is generated either in the blood itself or in the substance of the internal organs, or most probably in both. At all events, the blood acquires during its circulation through different organs slightly different degrees of warmth. Thus Claude Bernard has found, by introducing the bulb of a delicate thermometer into the vessels of a living dog, that the temperature of the blood in the abdominal aorta varied from 99·5° to 105·5°; in the portal vein, from 100° to 106°; and in the hepatic vein, from 101° to 106·8°. The warmest blood in the body, on the average, was that of the hepatic vein, which had passed through two successive capillary circulations, namely, that of the intestines and that of the liver, since leaving the arterial system. On the other hand, while passing through an organ in which it is exposed to the influence of air and evaporation, the blood diminishes somewhat in temperature. Thus, in passing through the lungs it was found to have lost sometimes a little less and sometimes a little more than ⅛° F. For the same reason, the temperature of the skin is habitually a little lower than that of the internal organs. If the bulb of a thermometer be taken between the fingers of the closed hand, it will rise only to 90° or 95°; in the axilla, carefully protected from the air, it will stand at 98°; while under the tongue, and in contact only with the vascular mucous membrane, it will reach 100°. In the external parts of the body, therefore, which are especially exposed to the influence of the outer air, the temperature may vary considerably. Especially the thinner parts, with a comparatively greater extent of surface, feel this variation in a marked degree, and may thus be affected with a local depression of temperature. On a very cold day the ends of the fingers, the nose, the ears, &c., may be cooled down very considerably, and in some instances may be even congealed and destroyed, without affecting sensibly the general system. But if the cold be so intense and long continued as to depress the general temperature of the blood and the internal organs, the system at large begins to feel its effects, and the vital powers yield to its influence. A benumbing effect is produced, followed by a difficulty of muscular exertion, a confusion of mind, drowsiness, and insensibility; and death takes place long before the body as a whole is actually congealed. Thus the maintenance of the internal temperature at or near the natural standard is a condition necessary to life. Experiments upon the warm-blooded animals have shown that in them, as a general rule, death is produced when the temperature of the blood is reduced to about 80°. The vital changes necessary to existence cannot go on below this point. On the other hand, the animal temperature may rise above the natural standard. There is no doubt that an increase of heat is produced in the muscular tissue during the contraction of these organs. We have already noticed the rise of temperature observed by Mr. Newport in a hive of bees when the insects were excited to activity. Becquerel and Breschet found the temperature of the biceps muscle of a man raised 1·8° by active contraction and relaxation continued for several minutes; and Matteucci observed an increase of 1° in the muscle of a frog separated from the body and artificially excited to contraction. It is a matter of common observation that a general sensation of unusual warmth follows any active muscular exertion. Not only is the temperature of the muscular system itself raised, but the rapidity of the circulation is accelerated, a larger quantity of warm blood is brought to the skin in a given time, and the sensitive integument thus feels the increased temperature. No doubt it is owing to this fact that active muscular exercise is itself a protection against external cold. An unusual degree of heat in the atmosphere also tends indirectly to raise the temperature of the body; for if the internal production of heat be the same, and its external loss by contact with the atmosphere be diminished, of course the actual temperature of the body would rise in consequence. A provision is made, however, against allowing this increase of temperature, whether from muscular exertion or external heat, to reach too high a point. This provision is the cutaneous perspiration. Anything which raises the bodily heat above the natural standard excites the circulation through the skin, and increases the quantity of perpsiration poured out upon its surface. This fluid, by its evaporation, uses up or renders latent a portion of the heat, and thus reduces the skin and the blood circulating through it to its natural temperature. The body therefore can be exposed to a very high external temperature without itself rising above its natural standard, provided the perspiration be free and its evaporation unimpeded. If the perspiration be checked, however, or if its evaporation be prevented by exposure to hot water, or hot air loaded with moisture, the temperature of the body rises, and death soon takes place. The experiments of Magendie and others have shown that in the higher animals life is destroyed when the blood generally has become heated 10° or 13° above the natural standard. Animals therefore have a natural internal temperature, which is essential to the performance of the vital functions, and which cannot be either raised or lowered to any considerable extent without producing death.—With regard to the precise mode in which animal heat is generated, and its exact chemical conditions, opinions are not entirely agreed. Many physiologists have entertained and still accept the belief that it is due to an oxidation or combustion of the elements of the blood and tissues by the oxygen absorbed in respiration. The grounds for this doctrine are as follows: 1. The most common and ready method by which heat is generated artificially is the combustion of substances, like wood and coal, which are rich in carbon. The rapid oxidation of these substances, which requires a free access of air, causes a great development of heat, and at the same time uses up the oxygen of the atmosphere, and produces as a result carbonic acid. The consumption of fuel, the degree of heat produced, and the quantities of oxygen absorbed and carbonic acid liberated, are all in direct ratio to each other. The process may go on rapidly or slowly; but in either case the relations of quantity remain the same. If the oxidation be rapid, as in a furnace or open fireplace with a strong draught, the fuel is soon consumed and a large quantity of heat is produced in a given time. If the process be retarded, as in a close stove with a limited or gradual admission of air, the consumption of fuel is slow, and the heat, less intense at any particular moment, is continued for a proportionally longer time. But in both instances, for the entire amount of heat which has been generated, there are the same quantities of fuel consumed, of oxygen absorbed, and of carbonic acid produced. 2. In the animal body the absorption of oxygen and the exhalation of carbonic acid are the most striking and constant of all the phenomena of nutrition. At the same time heat is evolved, as in the case of artificial combustion; and it is very natural to connect the two sets of phenomena with each other. Furthermore, as in artificial combustion, the elevation of temperature in different animals corresponds very closely with the activity of respiration and the quantity of the two gases inspired and exhaled. These considerations have led to the adoption of the theory, at once intelligible and comprehensive, which attributes the production of animal heat to the direct oxidation or combustion of the carbonaceous ingredients of the food and tissues.—On the other hand, there are certain facts which are less favorable to the above theory. 1. In the first place, though the combustion of carbonaceous matter happens to be the most familiar and useful of the artificial means for producing heat, it is by no means the only one which will have that effect. A great variety of both physical and chemical changes, other than oxidation, are attended with an elevation of temperature, often of a very active kind; as in the ordinary slaking of lime, where a boiling temperature may be reached in a few minutes by the simple combination of water with the alkali, which already contains the oxygen it is capable of absorbing. A great variety of chemical and physical changes are constantly going on in the process of nutrition, varying in their character in the different organs; and of their details we are in many cases still ignorant. As we have seen that animal heat is produced as a local phenomenon in the different organs, it may be the result of these combined changes, which vary in character in different parts of the body. 2. The first absorption of oxygen by the blood, which takes place in the lungs, is not accompanied by any very marked elevation of temperature. This elevation, if it exist at all, is not sufficient to compensate for the cooling effect of the air and exhalation in the pulmonary cavities; for we have seen that in the living animal the blood has been found by experiment to lose slightly instead of gaining in temperature while passing through the lungs. The oxygen is here taken up by the red blood globules, and thence distributed to the tissues; but it is doubtful whether its subsequent transfer to the ingredients of the tissues has any more the character of an active combustion than its first absorption by the blood. Some physiologists regard oxygen as a kind of food which must be supplied to the body with great regularity and constancy, and which is destined to become a constituent part of the tissues very much in the same manner as other nutritive elements. 3. The production of carbonic acid in the interior of the body is directly due, not to a combination, but to a decomposition of the ingredients of the tissues. Carbonic acid may be generated at any time in either of two ways: by the immediate combination of oxygen with carbon, as in the combustion of charcoal; or by the decomposition of another body still more compound in its nature, as in the decomposition of carbonate of lime by an acid, or the decomposition of sugar in fermentation. In both these latter cases carbonic acid is evolved without any direct oxidation taking place; and the process will go on accordingly without the access of oxygen or atmospheric air. In the animal body it is by such a process of decomposition that carbonic acid is produced; and the proof of this is, that if the fresh muscles of a frog, or the living animal itself, be enclosed in an atmosphere of hydrogen or nitrogen, or even in a vacuum, they will still for a considerable period continue to exhale carbonic acid. This has been fully shown by the experiments of Marchand. 4. While it is true that the development of animal heat is in proportion to the consumption of oxygen and the exhalation of carbonic acid, this is also true of most if not all the other substances consumed and eliminated by the living body. An abundant production of warmth coincides with a general vigor and activity of all the animal functions, with muscular exertion, capacity of endurance, and a liberal consumption of both the nitrogenous and non-nitrogenous elements of food. We cannot safely attribute the heat-producing power exclusively to one or the other class of alimentary substances; for while fat and albuminous matters are both consumed in large quantities in cold climates, on the other hand starchy materials form a considerable proportion of the food in warm weather and in tropical climates. In point of fact, oxygen and carbonic acid are two substances which enter and are discharged from the system by the same organ, the lungs; but there is not necessarily any direct relation between them, except that oxygen is one of the nutritious substances essential to the body, and carbonic acid is excrementitious.

ANIMAL MAGNETISM, or **Mesmerism**, an influence analogous to terrestrial and metallic magnetism, supposed to reside in animal bodies and to be capable of transmission from one to another. It was first brought into notice in Germany in 1775 by Mesmer, a native of Swabia, who had graduated in medicine at Vienna nine years before, and had written as his inaugural thesis a treatise on "The Influence of the Planets on the Human Body." He regarded the new force, which he said could be exerted by one living organism upon another, as a means of alleviating or curing disease. Maximilian Hell, a professor of astronomy at Vienna, had made some suggestions to Mesmer a few years earlier as to the possibility of producing an effect on the human body by magnetism, and he soon claimed to be the discoverer of the new influence. Mesmer declared that the effects he produced were those of animal magnetism, capable of transmission without his touching the body of the patient, while Hell's theory, he affirmed, had made necessary the actual contact of the patient with a metallic magnet. The disputes to which this rivalry gave rise, together with various accusations of imposture, caused Mesmer to receive a warning from the government. He left Vienna, and in 1778 transferred his residence to Paris. Here he appears to have been from the first regarded with dislike, or at least with suspicion, by the medical profession, but with great favor by the general public. He received at his house patients suffering from various diseases, and performed upon them many reputed cures by the influence of the magnetic fluid. His method was to seat himself in front of the patient, with his eyes steadily fixed upon him, and to perform with the hands a few preliminary manipulations about the epigastrium and hypochondrium in order to establish between them what he called the "magnetic relation." He then proceeded to operate upon the diseased part by touching it with the right hand on one side and the left on the other, and performing certain circular or vibratory movements with the fingers which were left free; an essential condition being that actual contact should be kept up on the two opposite sides in order that the magnetic influence might circulate, passing into the body of the patient on one side and out again on the other. His idea with regard to the nature of the influence termed animal magnetism may be best conveyed in his own words, as contained in a set of so-called "propositions" or "assertions," in a volume published by him in 1779 and entitled *Mémoire sur la découverte du magnétisme animale.* The most important of these propositions are as follows: 1. "There exists a mutual influence between the celestial bodies, the earth, and animated beings." 2. "This reciprocal action is regulated by mechanical laws which up to the present time have been unknown." 3. "Animal bodies are susceptible to the influence of this agent; and they are affected by it on account of its disseminating itself through the substance of the nerves." In cases where the body was affected by some disorder which pervaded all parts of the system, Mesmer was in the habit of magnetizing his patients with long and wide passes, made from a distance, either with the open hands or with the aid of a short rod or wand of glass or steel. His success with the public, however, and the number of patients who presented themselves, increased so rapidly that he could no longer give to each one the personal attention rendered necessary by this method of practice, and a new one was adopted which soon became the main feature of the magnetic system, and was in fact the principle from which mesmerism, or animal magnetism as practised by Mesmer, acquired its greatest reputation and popularity. This was the "magnetic tub," about a foot and a half high and six feet in diameter, placed in the centre of a spacious apartment. This tub was filled with water up to a certain level, and its bottom covered with a mixture of iron filings and broken glass. Around its outer circumference were ranged a series of bottles with their necks looking inward toward the centre, and around its centre another set of bottles with their necks looking outward. The whole tub was surmounted by a wooden cover pierced with a number of small holes; and through these holes were inserted an equal number of glass or metallic rods bent at right angles, the inner ends of which dipped beneath the surface of the water, while the outer portions radiated horizontally in every direction, and were held in contact with the bodies of the patients, arranged in concentric circles round the tub. Thus a large number could be subjected at the same time to the magnetic influence. The tub was a sort of reservoir in which the magnetic force was condensed, and from which it radiated in continuous currents through the bodies of the patients. Its circulation was secured by means of a long cord, attached by one extremity to the tub, and passed in successive loops round the waist of each person, the magnetizer himself forming one link in this continuous chain of living bodies. Thus the magnetism, radiating from the tub by the metallic rods, returned again to it by means of the cord, and so continued its course in a closed circuit without ever becoming exhausted. The more susceptible of the patients soon felt a nervous influence pervading the affected parts, or even their whole bodies. This often became so intensified as to produce irregularity of respiration, and, especially among the female patients, sobs and laughter of an hysterical nature, exaltation of the sensibilities, partial unconsciousness, and even convulsions and a kind of maniacal delirium. These effects, however, lasted but for a time after the patient was removed from the magnetic circle, and resulted in many cases, according to the assertions of Mesmer and his friends, in the relief or cure of diseases previously regarded as hopeless. The receipts of Mesmer from the patients resorting to his establishment were said at one time to amount to nearly 100,000 francs a year. His system had indeed become so popular that he ventured to address a note to the French government, stating that he had discovered an agent by which most of the diseases of the human frame could be cured, and requesting the grant of a certain château and adjoining lands as a reward for his discovery, and as a place for the establishment of a great healing institute. The government refused his request, but offered him a yearly pension of 20,000 livres, and a certain sum for the establishment of a hospital, on condition that he should teach his doctrines to some persons, of whom three should be selected by the government. This offer he rejected; and his friends, desirous of giving him some lasting pecuniary reward for his discoveries, proposed that classes should be formed of pupils whom he should instruct in animal magnetism. Each pupil should pay 100 livres as tuition fee, and bind himself not to teach others. These classes were formed, and they paid him in all 340,000 livres. Among those who subscribed themselves as pupils were Lafayette, D'Esprémenil, the marquis de Puységur, and Dr. D'Eslon. D'Eslon was a man of much influence, and held the post of physician to the king's brother. He took great interest in animal magnetism, used it in his practice, and made a large fortune by its means. In 1784 the French government ordered the medical faculty of Paris to investigate Mesmer's theory, and make a report upon it. Under this order a commission was appointed, consisting of Benjamin Franklin (at that time minister to France from the United States), Lavoisier, Bory, Bailly, Majault, Sallin, D'Arcet, Guillotin, and Le Roy. Mesmer refused to appear before them, but D'Eslon took his place, made himself the advocate of the new doctrine, and tried a great number of experiments before them. In their report to the government the commissioners say that, "in regard to the existence and the utility of animal magnetism, they have come to the unanimous conclusion that there is no proof of the existence of the animal magnetic fluid; that this fluid, having no existence, is consequently without utility; and that the violent effects which are to be observed in the public practice of magnetism are due to the manipulations, to the excitement of the imagination, and to that sort of mechanical imitation which leads us to repeat anything which produces an impression upon the senses." The special report of the committee of the academy of sciences, consisting of Franklin, Le Roy, Bory, Lavoisier, and Bailly, and made to the academy itself, concludes as follows: "Magnetism, accordingly, will not have been altogether valueless for the philosophy which pronounces its condemnation; it is one more fact to be recorded in the history of the errors of the human mind, and an important experiment upon the power of the imagination." (*Histoire de l'académie royale des sciences*, 1784, p. 15.) This report of the commission, together with a previous quarrel in regard to money matters between Mesmer and his partisans, seems to have rapidly diminished the prosperity and esteem which he had enjoyed in Paris. He left that city in 1785, and passed the rest of his life in retirement in Switzerland, in the possession of considerable wealth acquired from his former magnetic practice.—About the time of Mesmer's retirement from Paris, animal magnetism entered upon a new phase of development, by the discovery by the marquis de Puységur of the magnetic sleep, or somnambulism, which afterward became still further developed by the addition of clairvoyance. It is under this title that the most surprising phenomena of animal magnetism have been exhibited during the present century. A magnetic clairvoyant is a person who, having been thrown into the somnambulistic condition by the manipulations of the magnetizer, becomes possessed of extraordinary powers of sense and perception. The term clairvoyant designates the power which is claimed for these persons of seeing distinctly through the substance of opaque objects. Thus a clairvoyant, it is said, can read a book unopened, or a letter which is enclosed in a solid wooden box. He can do this as well as with his eyes closed or bandaged as if they were open and uncovered. Sometimes the sense of sight, or a faculty capable of perceiving things which the normal man perceives only by means of the organ of vision, seems seated in the forehead, in the backhead, in the fingers, or in the knuckles of the hand. It is asserted that the clairvoyant can hear also without using his ears, and with more acuteness than can others in the waking state using their ears. Sometimes the sense of hearing appears to have its seat at the pit of the stomach, and the clairvoyant hears no sounds except those made at his breast. The senses of taste, touch, and smell are ordinarily inactive. But while insensible to impressions upon his own nerves, he feels all those which are experienced by his magnetizer; and if the latter be pinched, the clairvoyant winces, as though he felt the pain at the corresponding part of his own body. He is governed by the will of the magnetizer; whatever the latter orders him to do, he does; and this order is understood and obeyed, even if not spoken, but merely thought. As the theory of these alleged phenomena was gradually developed, mesmerism again rose into some degree of favor. M. Deleuze, assistant secretary and naturalist of the Jardin des Plantes, published in 1813 a favorable "Critical History of Animal Magnetism;" and other friendly publications followed rapidly in France and Germany. Several able German physiologists spoke of the new agent as worthy of attention. Well conducted magazines were established to propagate its principles. The Prussian government took notice of it in 1817, so far as to order that none save physicians should practise it; and in the following year the academy of sciences of Berlin offered a prize for the best treatise on the subject, but this offer was subsequently withdrawn. Ennemoser, Kluge, Kieser, Wolfarth, and Nees von Esenbeck defended mesmerism in books and magazines before the German public, and Deleuze kept the subject before France by publishing a number of works. In 1825, Dr. Foissac, a young physician and an enthusiastic believer in animal magnetism, demanded of the royal academy of medicine in Paris that another commission should be appointed, and another investigation made. The academy consented and appointed a commission of five members to conduct the inquiry. Their report, not made till 1831, while it did not concede by any means all that the believers in the new force claimed, was in general favorable to the theory of its existence and effects; and although not regularly adopted by the academy, or printed as a part of its formal memoirs, it gave a powerful impulse to the investigation of mesmerism, and extended it into Britain and America, where it had been almost unknown before. In 1833 J. C. Colquhoun published in English a translation of the report with remarks; in 1836 he published an original work on the same subject, entitled *Isis Revelata*. In 1837 the subject was again taken up by the academy. A committee of nine was appointed, among whom were Roux, Bouillaud, and Cloquet, who tested in several sessions the phenomena exhibited by a reputed clairvoyant. Their report, made Aug. 17, 1837, detailed all the particulars of their investigations, and expressed the results as follows: "The facts which had been promised by M. Berna (the magnetizer) as conclusive, and as adapted to throw light on physiological and therapeutical questions, are certainly not conclusive in favor of the doctrine of animal magnetism, and have nothing in common with either physiology or therapeutics." This report was adopted by the academy Sept. 5, 1837. In the same month M. Burdin, a member of the academy, made a standing offer of 3,000 francs to whoever within two years should produce a clairvoyant able to read without the use of the light, the eyes, or the touch. The conditions of the trial were afterward modified so that the paper to be read might be illuminated, provided the eyes of the clairvoyant were properly covered, and the sense of touch might be used as an aid, but with a smooth glass surface covering the object to be examined. The time during which the prize was to remain open was also extended to three years. The money was deposited with a notary subject to the order of the academy, and a committee appointed to supervise the experiments. Several clairvoyants appeared as contestants for the prize at various times, but the committee in each case reported their complete failure.—About 1840 a new and prominent student of animal magnetism appeared in the person of Mr. Braid of Manchester, England, who discovered that he could produce sleep in most persons whom he tried, by ordering them to look steadily at some small object about a foot from the eyes, and above their level. He gave the name of "hypnotism" to the sleep and somnambulism thus produced, and styled his theory for the explanation of the phenomena "neurypnology." The principles discovered by him were applied by other persons in various ways, and variously styled "biology," "electro-biology," &c. All the phenomena produced under these different names are substantially mesmeric. Mr. Braid had no faith in clairvoyance proper; but he admitted an "exaltation of the senses" in the mesmeric and hypnotic states, giving a delicacy of perception, and sometimes a perspicacity of reasoning, exceeding that of the normal state. These views were sanctioned by Dr. William B. Carpenter in his "Human Physiology."—Recently there has been no special change in the doctrine of clairvoyance, except that it has become somewhat closely connected with that of spiritualism. While the members of the medical profession, with few exceptions, have always opposed the claims of mesmerism, these have nevertheless found supporters in many men of learning and eminence; among them, besides those already mentioned, are Laplace, Cuvier, Agassiz, Hufeland, Sir William Hamilton, Dr. Herbert Mayo, and Prof. Edward Hitchcock. For information in regard to the theories of its advocates, see Deleuze's "Practical Instruction in Mesmerism;" "Letters on Animal Magnetism," by Prof. William Gregory; "Mesmerism, its History, Phenomena, and Practice," by William Lang; "Facts in Mesmerism," by the Rev. Chauncey Hare Townshend; "Truth in Popular Superstitions," by Dr. Herbert Mayo; and "Practical Instruction in Animal Magnetism," by Dr. Alphonse Teste.

ANIMÉ (Fr., animated), a resin supposed to be derived from the *hymenæa courbaril* of South America. It exudes from wounds in the bark, and collects between the principal roots. This resin is soft and sticky, and melts easily, diffusing white fumes and a very pleasant odor. Insects are generally entrapped in such numbers in it, that it is said to well merit its name of animated. The Brazilians use it internally in diseases of the lungs. It was formerly employed in the composition of ointments and plasters, but at present its only use is for varnishes and incense.

ANISE SEED, the fruit of the *pimpinella anisum*, a native of Europe and Africa. It is extensively employed as a carminative medicine, and for the purpose of flavoring liqueurs or medicines. It yields an aromatic oil both by distillation and expression, which is used for the same purposes as the seed, and is also a favorite article with vermin-killers, who employ it to disguise the scent of poisonous baits. The anise-seed cordial of the shops is a compound of alcohol, anise seed, and angelica. The plant is cultivated in Malta and Spain, and grows spontaneously in Egypt and the islands of the Grecian Archipelago, especially Scio. The genus *pimpinella* belongs to the umbelliferous tribes of plants inhabiting meadows and mountains in Europe and Africa.

Anise (Pimpinella anisum).

ANJOU, an ancient province of N. W. France, chiefly constituting the present department of Maine-et-Loire, with Angers for its capital. In the time of the Romans it was inhabited by the Andegavi. During the Frankish and feudal eras its counts played an important part in European history. The eldest branch of the family traced its descent to the days of Charles the Bald in the 9th century, and the younger branches to those of Louis VIII. and XI., in the 13th. Among the eminent counts of Anjou, those of the name of Foulques or Fulk were distinguished as crusaders, especially Foulques V., who in 1131 succeeded his father-in-law Baldwin II. as king of Jerusalem. His son Geoffrey, surnamed Plantagenet, became through his marriage (1127) with the empress Matilda the father of Henry II. of England. Charles, brother of St. Louis, commonly called Charles of Anjou (born about 1220), a brave crusader, heir to Anjou and Provence, became the founder of the younger branch which reigned over the Two Sicilies. In 1356 Anjou was made a duchy. Louis, son of King John II., was the first duke, and ancestor of the "good King René of Anjou." The last of this branch, Charles IV., bequeathed the duchy to Louis XI., who permanently annexed it to France (1483). Since that time Anjou has merely given honorary titles to Bourbon princes. Among them was François, fourth son of Henry II. and Catharine de' Medici, duke of Alençon, afterward duke of Anjou (born in 1554). He was famous for his zeal in favor of the Huguenots, and his opposition in the Netherlands to Philip II. After having been for a short time acknowledged by the Netherlanders as ruler under the title of duke of Brabant (1582), they expelled him on account of his autocratic measures. He was one of the rejected suitors of Queen Elizabeth. Several descendants of Louis XIV. bore the title of dukes of Anjou. Louis XV. bore it anterior to that of dauphin; and Philip V. was known in France under the same title before he became king of Spain, at the beginning of the 18th century.

ANJOU, Margaret of. See MARGARET.

ANKLAM, an old town of Germany, in the Prussian province of Pomerania, on the river Peene, 6 m. from its mouth in the Stettin-Haff, 45 m. N. W. of Stettin, and 91 m. by railway N. of Berlin; pop., including the three suburbs, in 1871, 10,739. It has an active trade.

ANKWITZ, Mikolaj, count, a Polish politician, executed in 1794. He was ambassador at Copenhagen, and deputy to the diet from Cracow. In the diet of Grodno, which was forced to sanction the second dismemberment of Poland, he played a prominent part; and when the treaty consummating it was concluded with Russia, he was deputed to sign it on behalf of Poland, July 23, 1793. Immediately afterward a salary of $13,000 was conferred upon Ankwitz by the Russian government, with the appointment of president of the council. When these facts became known, the rage of the people knew no bounds. On April 18, 1794, soon after the breaking out of the revolution of which Kosciuszko became the leader, he was accused of treason, and his correspondence was seized, which established his guilt. He was hanged, and buried in the felons' graveyard.

ANNA CARLOVNA, grand duchess of Russia, originally called Elizabeth Catharine Christina, daughter of Charles Louis, prince of Mecklenburg, and Catharina Ivanovna, daughter of the eldest brother of Peter the Great, born in 1718, died March 18, 1746. She was a niece of the empress Anna Ivanovna. In 1739 she married Anthony Ulrick, duke of Brunswick-Wolfenbüttel. They had in 1740 a son, Ivan, whom the empress Anna designed as heir to the Russian crown, appointing Biron regent. After the death of the empress the same year, Anna Carlovna overthrew the regency of Biron and took affairs into her own hands, declaring herself grand duchess. A year later (December, 1741) she was overthrown by Elizabeth, daughter of Peter the Great, who was declared empress. The boy Ivan was shut up in the fortress of Schlüsselburg, where he perished. Anna, her husband, and a daughter were sent to Kholmogory, a small town on an island in the Dwina, near the White sea, where she died.

ANNA COMNENA, daughter of Alexis Comnenus, emperor of Constantinople, and the empress Irene, born Dec. 1, 1083, died in 1148. She was married to Nicephorus Bryennius, a Greek nobleman of distinction, whom she incited after the death of her father, in 1118, to conspire against her brother and seize the sceptre. The conspiracy failed, and Anna and her husband were banished from Constantinople and stripped of most of their property. Anna during her exile composed a biography of her father, which she styled *Alexias.* This work is divided into 19 books, and, though very defective in many respects, is yet of great importance as a history of the period of which it treats. The best edition of the *Alexias* is Schopen's, published at Bonn in 1839.

ANNA IVANOVNA, empress of Russia, born in 1693, died Oct. 28, 1740. She was the daughter of Ivan, the eldest brother of Peter the Great, and married the duke of Courland, who died previous to her ascending the throne. She became empress on the death of Peter II., grandson of Peter the Great, in 1730. Ostermann, the great chancellor, and the then all-powerful princes Dolgoruki facilitated her elevation over the heads of two daughters of Peter the Great, as Anna promised a limitation of the autocracy. But Anna brought from Courland to Moscow her favorite, the former equerry Biron, who prevented her from keeping her promise, exiled the Dolgorukis to Siberia, and ruled absolutely over the empress and the nation. He organized the system of espionage over all classes, officials and private individuals, which with more or less rigor prevailed for more than a century. Anna interfered in the affairs of Poland, in 1733, in favor of Augustus III. against Stanislas Leszczynski, and obliged the Courlanders to choose Biron for their sovereign duke, and on her deathbed named him regent during the minority of her nephew Ivan; but a revolution overthrew him, and he was exiled to Siberia.

ANNABERG, a town of Saxony, in the Erzgebirge, 2,000 feet above sea level, in the district of Zwickau, 19 m. by railway S. of Chemnitz; pop. in 1871, 11,639. The mining, formerly of great importance, has been diverted to other localities, and the government department relating to it was removed in 1856 to Marienberg. Annaberg, however, besides being the seat of various district authorities, continues to be an important centre for the manufacture of lace and fringes, which latter industry was introduced about 1590 by Protestant refugees from Spanish oppression in Flanders. Crinolines are also made here to the extent of over 100,000 dozens annually. The town was founded in 1496.

ANNALS (Lat. *annales*, that is, *libri annales*, year books), a concise and unadorned narrative of events, written in the order of time. In the early days of Rome the pontifex maximus kept a record of state affairs, prodigies, and the markets, which, written upon a white tablet, was displayed in some convenient portion of his house to the public inspection. These records were called *annales maximi*, and were written down to the pontificate of Publius Mucius Scævola, 131 B. C. When the Gauls burned the city, 390 B. C., the greater portion of those previously written were destroyed. Subsequently, other individuals composed portions of Roman history, imitating in style the pontifical annals. The first of these works, which was written by Quintus Fabius Pictor, commenced with the founding of Rome, and came down to the author's own time, during the second Punic war.

ANNAPOLIS, a city of Anne Arundel county, Md., capital of the county and of the state, 28 m. S. by E. of Baltimore, and 40 m. E. by N. of Washington; lat. of the state house, 38° 58′ N., lon. 76° 29′ W.; pop. in 1860, 3,228 whites and 1,301 colored; in 1870, 5,744, of whom 1,682 were colored. It is beautifully situated on the Severn river, about 2 m. from its junction with the waters of Chesapeake bay. For a long period before Baltimore was at all noted, Annapolis was the seat of wealth, refinement, and extensive trade. It was formerly a port of entry, but has lost its commercial importance, and is now chiefly distinguished as the seat of the state government and of the United States naval academy. The city is connected with Baltimore and Washington by railroad, and with the former also by regular lines of steamers. The plan of the city bears some resemblance to that of the national capital, all the streets radiating from two points, the state house and the Episcopal church. Its appearance is interesting from its air of quiet seclusion; and the antique look of many of the houses, with their peculiar style of architecture, gives the stranger an impression of some old European town, rather than that of an American city. The state house, standing on an eminence, is a noble and massive structure of brick, with a lofty dome and cupola. It contains the halls of the legislative assembly, as well as the state library and records. St. John's college, founded in 1784, is a state institution. In 1868 there were 10 instructors, 433 graduates, and about 3,500 volumes in the library. St. Mary's seminary, a Roman Catholic institution, is also situated here. Three weekly papers are published in the city. The naval academy was established in 1845 by the Hon. George Bancroft, then secretary of the navy. Candidates (who must be over 15 and under 18 years of age) are admitted to the institution after passing a thorough physical examination, as well as an examination in the elements of an English education. They remain in the institution four years, under strict discipline and instruction in all the branches of the naval profession, before they are examined for admission into the navy as midshipmen. The academic board is composed of the superintendent of the institution, who must be an officer of the navy, not below the rank of commander; the executive officer, or commandant of midshipmen, with four assistants, who must be either commanders or lieutenants in the

United States Naval Academy, Annapolis.

navy, and who discharge the duties of instructors in seamanship, naval tactics, and practical gunnery; and the professors of mathematics, of steam engineering, of astronomy, navigation, and surveying, of natural and experimental philosophy, of field artillery and infantry tactics, of ethics and English studies, including international law, of the French and Spanish languages, and of drawing and draughting. The academic staff consists of the members of the academic board as heads of the different departments, assisted by 64 professors and instructors. The grounds connected with the establishment are extensive, having recently been considerably enlarged. Across College creek 114 acres were added in 1869, and in 1870–'71 a large naval hospital was built upon this ground at a cost of over $150,000. The grounds immediately surrounding the academy contain buildings for recitation and lecture rooms, mess rooms, dormitories, officers' quarters, a philosophical hall and laboratory, and an astronomical observatory. The observatory has an equatorial telescope constructed by Clark of Boston, with a fine achromatic lens of 7¾ inches clear aperture, and 9½ feet focal length; an excellent meridian circle by Repsold of Hamburg; and a very complete collection of the minor instruments used by the travelling astronomer, the surveyor, and the navigator. The academy has a carefully selected library of about 15,000 volumes, to which additions are made annually. Fort Severn, to which the grounds formerly pertained, is now enclosed and covered with a roof, and used as a gymnasium and ball room. Two sloops of war are attached to the institution, used during the summer months as practice ships, and for sailing upon an ocean voyage. At the beginning of the academic year 1870 the whole number of midshipmen in the several classes was 253; 68 graduated at the end of the year, and 100 were admitted. During the civil war, the academy was removed to Newport, R. I., but soon after its close was brought back here.—Annapolis was settled in 1649 by puritan refugees from Virginia, under a ruling elder named Durand, and was at first called Providence. The next year Brooke, under a commission from Lord Baltimore, organized the county under its present appellation, and called the settlement Anne Arundel Town in honor of Lady Baltimore. A few years later it was again known as Providence, and was the seat of a Protestant council, disputing the legislative authority with the Catholic council at St. Mary's. The latter was finally abandoned in 1694, and the government was established at the settlement on the Severn, where a town had been regularly laid out and called Annapolis after Queen Anne, who gave it some valuable presents. A city charter was granted in 1708. At the close of the revolution Maryland offered to cede Annapolis to the general government as the federal capital. During the negotiations for a permanent site, it was resolved in 1783 that congress should meet alternately at Annapolis and Trenton, the first session to be held at Annapolis. It was at this session that Washington surrendered his commission as commander-in-chief, Dec. 23, 1783.

ANNAPOLIS. I. A W. county of the province of Nova Scotia, Canada, bounded N. W. by the bay of Fundy; area, about 1,700 sq. m.; pop. in 1871, 18,121. The principal river is the Annapolis, which flows S. W. about 60 m., through an expansion called Annapolis basin, to the bay of Fundy. The surface is varied. The elevated ridge of the North mountains extends along the coast, with flanks of excellent soil; the uplands of the valley of Annapolis river are well adapted to fruit culture; and the region S. of the Annapolis valley is broken but generally fertile. There is a valuable bed of iron ore near the Moose and Nictaux rivers. The chief employment of the population is agriculture, and the exports of dairy produce are considerable. **II.** A town (formerly *Port Royal*), capital of the above-named county, situated on Annapolis basin, in lat. 44° 40′ N., lon. 65° 37′ W., 95 m. W. of Halifax, with which it is connected by railway; pop. 2,127. The basin is a capacious and sheltered harbor, but the entrance, through Annapolis strait, is narrow and difficult. The first European settlement on this part of the coast was made here by De Monts in 1604. Under the name of Port Royal it was the capital of the French colony of Acadia, after the conquest of which by the English in 1710 the name of the town was changed. The capital was removed to Halifax in 1750.

ANN ARBOR, a city of Michigan, capital of Washtenaw county, lying on both sides of Huron river, in lat. 42° 15′ N., lon. 83° 48′ W., 38 m. by railroad W. of Detroit; pop. in 1870, 7,363. The Huron river, and a creek which empties into it from the south, supply valuable water power. There are within the limits of the township 2 woollen mills, 4 flour mills, 5 breweries, 2 factories of agricultural implements, 2 tanneries, 2 printing offices, numerous saw mills, planing mills, and workshops for wood and iron, 10 churches (2 Baptist, 2 Methodist, Catholic, Episcopal, Congregational, Presbyterian, Lutheran, and Unitarian), and 6 school houses, one of which has accommodation for 1,000 pupils. There are numerous fruit gardens, and the streets are thickly planted with shade trees. Two railroads pass through the town, the Michigan Central, E. and W., and the Toledo and Saginaw, N. and S., and the city is the centre of a brisk inland traffic. There are five mineral springs in the city (over one of which has been erected a large water-cure establishment), an opera house, concert halls, and a ladies' library association. Of the resident inhabitants, about one quarter are of German descent, and the German language is taught in the schools. The most important interest of Ann Arbor is the Michigan university. (See MICHIGAN UNI-

VERSITY.) Ann Arbor was settled in 1824, and incorporated as a city in 1851.

ANNATS, or **Annates**, originally certain funds which by ecclesiastical law were paid by a new incumbent of a church living to the pope or bishop. As the name indicates, they amounted to the first year's stipend from the living, and were required in one instalment, but were afterward paid in two. In England they were at first paid to the archbishop of Canterbury; the popes afterward appropriated them. The English parliament in 1532 bestowed them on the crown, but Queen Anne restored them to the church, for the support of the poorer livings, whence they have been called Queen Anne's bounty. In Germany annats are synonymous with the *servitia*, an early form of taxation in the western church.

ANNATTO. See ANNOTTO.

ANNE, queen of Great Britain and Ireland, the last member of the house of Stuart who sat upon the English throne, born at Twickenham, near London, Feb. 6, 1664, died Aug. 1, 1714. She was the second daughter of James II., then duke of York, by his first marriage with Anne Hyde, daughter of the illustrious Clarendon. Though both her parents became attached to the Roman Catholic church, she was educated in the principles of the church of England, and in 1683 was married to Prince George, brother of Christian V., king of Denmark. It was for some time a matter of doubt and deep anxiety what part she would take in the contest which distracted England between James II. and the party of the prince of Orange; but the influence of the vehement duchess of Marlborough, for whom Anne had a romantic fondness, at length made her decide the question against the promptings of filial affection. She renounced the purpose of accompanying her father in his exile, adhered to the dominant party, and by the act of settlement the British crown was guaranteed to her and her children in default of issue to William and Mary. She lived in retirement till the death of William, and the friendship between her and the king and queen was only formal. Of the 17 children whom she bore to her husband, only one survived infancy, the duke of Gloucester, who died in 1700, at the age of 11. On the death of William in 1702, Mary having previously died without heirs, Anne ascended the throne. Though feeble in character, she pursued the plans of her predecessor against the ambition of Louis XIV., and on the day of her coronation the triple alliance was renewed between England, Holland, and the German empire, against France. This was shortly after the opening of the war of the Spanish succession, in which Prince Eugene and Marlborough, by the victories of Oudenarde, Ramillies, and Blenheim, drove the French troops from the Danube across the Rhine. In the battle of Malplaquet, the son of James II., the chevalier St. George, charged at the head of the French cavalry the army of his sister Anne, commanded by Marlborough. The most important conquest made by England in this war was the fortress of Gibraltar. The great political event of the reign of Anne was the union of England and Scotland, completed May 1, 1707. In 1710 the popularity of Marlborough, who had been for eight years the idol of the queen, the parliament, and the people, began to wane, and his duchess lost the queen's confidence. The tories, who now had in their ranks the ablest statesmen and the most effective writers, increased in power, and the whigs completed their own ruin by the prosecution of Dr. Sacheverell for preaching in favor of the divine right of kings. In the new election the tories were successful, a new ministry was formed, in which Harley, afterward earl of Oxford, and Lord Bolingbroke were the chiefs, and a new favorite, Mrs. Masham, the daughter of a London merchant, reigned at court. It was determined to conclude peace, and the fruits of the war, not less than the allies of England, were neglected in the treaty of Utrecht, signed April 11, 1713. The new leaders were not harmonious, and though the crown had been settled, in the event of Anne's death without children, upon the princess Sophia of Hanover, the granddaughter of James I., yet the court and courtiers were occupied with intrigues to give the succession to the son of James II., James, the chevalier St. George. The queen, wearied with the wrangling and cabals of her ministers, suddenly died; and her death, at a moment when the plans of Bolingbroke were immature, was perhaps the means of securing peacefully to England the Protestant succession. Anne was deficient in mental vigor, but amiable. Though she was obliged twice to set a price upon the head of her brother, she seems to have cherished for him a strong affection. Her reign, distinguished by successful wars, has also been called the Augustan period of English literature. The writings of Addison, Pope, Steele, Swift, and Defoe adorned the age, and periodical sheets and newspapers, such as the successive numbers of the "Spectator," then first came into fashion.

ANNEALING (Sax. *anælan*, to heat), a process of softening and toughening certain metals and glass by heating them, and then cooling them very slowly. In working some of the metals under the hammer, or in rolling them into plates, or in drawing them out into wire, they become hard and brittle, so that the process cannot be continued without restoring them to their former condition. This is done by annealing. It has sometimes to be often repeated in drawing out a single plate of brass or aluminum. The jarring motion to which the wheels of railway cars and their axles are subjected changes in time the soft, fibrous texture of the iron into a crystalline structure approaching that of cast iron. They become brittle, and can be restored only by working them over and annealing. Intense cold produces a similar effect when the change of temperature is very sudden. The tempering of steel is an artificial hardening of the same nature. Cast iron may be chilled and become as hard as steel, but brittle. It may be annealed (with a slight change in the composition at the same time) and form malleable castings—even cast-iron nails that will clench.—The subject is more particularly interesting as it relates to the changes effected by temperature in glass. When this is melted and shaped into articles which are allowed to cool in the air, the glass becomes too brittle for any use. The exterior cools first and forms a contracted crust, which shelters the interior particles; so that these continue longer in a semi-fluid state, and are prevented from expanding, as glass does in cooling, and uniting with the rest to form a homogeneous mass. The inner parts are thus constantly tending to expand. If, on the contrary, the glass is placed in a hot oven, and this is allowed to cool very slowly, the particles of glass appear to assume a condition of perfect equilibrium of cohesive force without tension, so that the mass becomes tough and elastic. The extreme effect of sudden cooling is very curiously shown in the philosophical toys called Prince Rupert's drops and the Bologna phial. The former, which were shown by Prince Rupert to Charles II. in 1661, are little pear-shaped lumps of glass, with a curved stem, formed by dropping melted glass into water. Most of the particles burst to pieces, but some assume this form. When taken out of the water they will bear a smart blow without breaking, the effect being spread equally throughout the whole body; but if a little piece be broken off the end of the stem, they will fly into fragments with a sort of explosion. Dr. Ure explains this phenomenon by referring it to the tendency of a crack once formed in the glass to extend its ramifications in different directions throughout the whole mass. The same effect is observed in the very large sheets of plate glass used for shop windows: once cracked, they are seen in time to fall to pieces, the cause no doubt being imperfect annealing. The Bologna phials are made of unannealed glass, 3 or 4 inches long and about ½ of an inch thick. No regard is paid to their shape. They will bear a pretty hard blow with a hammer handle on the outside, or a small bullet may be dropped into one without breaking it; but if a sharp fragment of sand, or small piece of stone, be dropped in, the glass will burst in pieces, generally at once, but sometimes after a considerable interval.

ANNE ARUNDEL, a central county of Maryland, on the W. shore of Chesapeake bay, bounded N. by the Patapsco river, W. by the Patuxent, and watered in the eastern half by the South and Severn rivers; area, 750 sq. m.; pop. in 1870, 24,457, of whom 11,732 were colored. The surface is undulating and hilly, and the soil is fertile. In 1870 the county produced 126,451 bushels of wheat, 560,359 ot corn, 65,888 of oats, 3,020,455 lbs. of tobacco, 21,521 of wool, and 142,632 of butter. Copper and iron ore are found. The Annapolis and Elk Ridge railroad passes through the county. Capital, Annapolis.

ANNE OF AUSTRIA, queen of France, daughter of Philip III. king of Spain, born Sept. 22, 1601, died Jan. 20, 1666. She was married in 1615 to Louis XIII., and in 1638, 23 years after her marriage, became the mother of Louis XIV., and in 1640 of Philip of Orleans, the first of that branch of the house of Bourbon. Cardinal Richelieu, the all-powerful minister of the weak Louis XIII., dreading the influence of the queen, or, as others pretend, having been refused by her as a lover, succeeded in prejudicing the mind of the king till he allowed Anne to be continually persecuted, exiled, and at times left to suffer the greatest penury. Richelieu accused her of conspiring with the dukes of Lorraine, with England, with her brother the king of Spain, with all the enemies of France, and with the conspirators at the court, against his own supremacy. At the death of Louis XIII. in 1643, the parliament, contrary to his will, appointed her regent during the minority of Louis XIV. Cardinal Mazarin, who is supposed to have been secretly married to her, ruled in her name, and provoked the revolt of some of the princes of the blood and other French grandees known as the war of the Fronde (1648–'53). (See FRONDE.)

ANNE BOLEYN, Bullen, or **Bouleyne,** queen of England, one of the wives of Henry VIII., beheaded May 19, 1536. The date of her birth is uncertain, some authorities placing it as early as 1500, others as late as 1507. She was a daughter of Sir Thomas Boleyn, afterward created Viscount Rochford and earl of Ormond and Wiltshire, and was one of the ladies selected to accompany the princess Mary to France at the time of her marriage with Louis XII. in 1514. When Mary returned after Louis's death, Anne remained behind attached to the household of Claude, the queen of Francis I. She was recalled to England in 1522 (or according to Froude in 1527), and admitted to the household of Catharine of Aragon. Here she seems to have been circumspect in her behavior, witty, vivacious, and accomplished. The stories of her questionable conduct at the French court rest upon insufficient testimony. It was not long before she attracted the attention of Henry, who obliged Wolsey to interfere and break off a proposed marriage between Anne and Lord Percy, son of the earl of Northumberland. Anne grew in favor precisely as the royal scruples about the validity of the marriage with Catharine increased. It was in the latter part of 1527 that Henry openly declared to Wolsey his intention to marry Anne as soon as the divorce could be obtained. The cardinal's opposition soon gave way before Henry's violent will, but Anne always looked upon Wolsey as her rival, and could not rest until she had persuaded the king to disgrace him. At last, after five years' agitation of the divorce, Anne was married to the king at Whitehall, Jan. 25, 1533, by Dr. Lee, one of the royal chaplains. She had already for three years resided in the palace and been Henry's constant companion, and a few months before the wedding had been created marchioness of Pembroke. The divorce question was now brought into the ecclesiastical court of Canterbury, where Cranmer had been created archbishop on purpose to decide it. In May he pronounced the marriage with Catharine null from the beginning, and Anne the lawful wife of his majesty; and on June 1 her coronation was performed with great pomp. Three months later was born the princess Elizabeth, whose subsequent reign shed so much splendor upon English history. The life of the court while Anne shared the throne was gay and easy; and when Henry began to tire of her and find stronger attractions in Jane Seymour, it was not difficult to convict Anne of improprieties, to say no worse. A committee, including with other lords her own father, appointed to inquire into her conduct (April, 1536), reported her incontinent with Brereton, Norris, and Weston of the privy chamber, Smeaton, the king's musician, and even her own brother, Lord Rochford. All the accused were sent at once to the tower. Anne was tried by a commission of peers under the presidency of her uncle, the duke of Norfolk, and found guilty, partly on the confession of Smeaton, though she herself and the other prisoners protested innocence to the last. Cranmer was compelled to pronounce her marriage with Henry null and void, as he had formerly pronounced Catharine's. Her prison hours were spent in alternations of composure and excitement; but on the scaffold she conducted herself with queenly dignity. Smeaton was hanged, and the other four accused were beheaded.

ANNE OF BRITTANY, queen of France, born in Nantes, June 26, 1476, died in the castle of Blois, Jan. 9, 1514. She was the daughter and heiress of Francis II., duke of Brittany. That duchy was her dowry on the marriage with Charles VIII., son of Louis XI. of France, Dec. 6, 1491, and thus became incorporated with France. She was previously affianced to Maximilian of Austria, but her guardian, Louis XI., dissolved the engagement, and thus assured the aggrandizement of his kingdom and family. After the death of Charles VIII., in 1498, she married his successor, Louis XII., and exercised a great influence over her husband and all around her. She was an example of virtue and industry, and administered the kingdom with ability during the campaigns of her husbands in Italy.

ANNE OF CLEVES, daughter of Duke John III., and fourth wife of Henry VIII. of England, died at Chelsea, July 16, 1557. To please the Protestant party, and to make friends among the Protestant German princes, Henry wedded her with reluctance, Jan. 6, 1540, but divorced her in July of the same year, and settled upon her an annuity of £3,000.

ANNECY, an old town of Savoy, capital of the French department of Haute-Savoie, pleasantly situated near the lake of its name, 22 m. S. of Geneva; pop. in 1866, 11,551. It has various factories, cotton-spinning mills, glass and iron works, and is the seat of a bishop. St. Francis de Sales was born here, and his relics are preserved in St. Mary's church.

ANNELIDA (Lat. *annellus*, a small ring), red-blooded worms, such as the earth worm, the lug worm, and the leech. They are the only section of invertebrate animals which have red blood. They form an extensive class, subdivided into four orders by Milne-Edwards. The body has an elongated form, with distinct, soft, semi-cartilaginous annulations, connected together by longitudinal oblique muscles, enabling the animals to twist themselves in various directions. The whole is covered with a moist skin, indicating by slight segments the soft annuli beneath. The first segment is furnished with a mouth, and in some species with eyes and tentacles; the last segment is furnished in some cases with bristle-like appendages, and in others, as in the leech, it is dilated into a sucker. Each segment has usually minute setæ, or spines, which are useful in locomotion. In some species vascular tufts are observed, which serve as respiratory organs. There is a system of veins and arteries. The nervous system consists of ganglia, united by means of a double nervous cord. Each individual is bisexual. The common or earth worms seek safety by retiring into holes which they bore in soft earth, mud, or sand. The *sabella* and *terebella* of the seashore agglutinate around them particles of sand and of broken shells to form a case in which they dwell. The *serpula* exudes a calcareous secretion to form a long twisted tube, in which the animal resides, and from which it protrudes its head and respiratory tufts. The four orders of this class are: 1, the *dorsibranchiata*, or *errantes*, including the sea centipedes and sea mice; 2, the *tubicolæ*, which include those that live in tubes, as the *serpula;* 3, the *terricolæ*, including the common earth worm; and 4, the *suctoriæ*, having suctorial disks, as the leech. From the recent researches of Prof. Edward S. Morse, it appears that the *brachiopoda* come near the tubiculous annelids; and he therefore removes them from the mollusca to the annelid division of articulata.

ANNESLEY, Arthur, first earl of Anglesey, born in Dublin in 1614, died April 6, 1686. He was the eldest son of Sir Francis Annesley, afterward Baron Mountnorris and Viscount of Valentia. He was among the loyal members who met in the parliament summoned by Charles I. at Oxford in 1643. The royal cause having become almost hopeless, he joined the parliamentarians, and was one of the three commissioners appointed to settle the affairs of Ireland in 1645. He took an active part in the restoration of Charles II., and in 1661 was created Baron Annesley and earl of Anglesey in the peerage of England. He was afterward made treasurer of the navy and lord privy seal, and held the latter office till 1682, when he was dismissed for favoring the exclusion of the duke of York from the throne. He published several works on polemics, politics, constitutional law, and parliamentary privileges. —JAMES ANNESLEY, Lord Altham, his grandson, born in 1715, was kidnapped by his uncle and sent to America, where he was 13 years in slavery, but finally in 1743 established his legal right to the honors and estates of the earls of Anglesey, though he never assumed the title. Smollett gave the leading facts of the case in his novel of "Peregrine Pickle."—The earldom of Anglesey expired in 1761, but the Irish peerages of Annesley and Valentia are held by descendants of Arthur Annesley.

ANNIUS OF VITERBO, an Italian Dominican, born at Viterbo about 1432, died Nov. 13, 1502. His real name was Giovanni Nanni, which he Latinized into Johannes Annius. He enjoyed the especial favor of Pope Alexander VI. and his family; though his death was believed to have been caused by poison administered by command of Cæsar Borgia, who wished to be rid of one whose plainness of speech offended his pride. Annius published in 1498 *Antiquitatum Volumina XVII.*, purporting to be a collection of works of ancient authors previously supposed to be lost, including Berosus, Marcus Cato, Manetho, and others. It has long since been condemned as spurious.

ANNO, or **Hanno, Saint,** archbishop of Cologne, died Dec. 4, 1075. He belonged to a noble family, and was destined at first to the profession of arms. He was chancellor under the emperor Henry III., and tutor of Henry IV. After the death of Henry III., aided by Archbishop Adalbert of Bremen, and others, he obtained the regency, but soon laid it down in disgust. The hymn of St. Anno, composed about a century after the archbishop's death, is a kind of panegyric on the saint, commencing with the popular traditions of Germany, and touching on the history of the archiepiscopal see of Cologne, and of 33 bishops before the poet, among whom were seven saints. It was first printed from a forgotten manuscript by Martin Opitz of Dantzic in 1639.

ANNONAY, a town of southern France, department of Ardèche, 37 m. S. of Lyons, noted as the birthplace of the Montgolfiers, inventors of the air balloon, and for its paper made at mills erected by these famous brothers; pop. in 1866, 18,445. It has several celebrated manufactories of gloves. It is the point of junction of the Cance with the Déaume river, which is here crossed by a suspension bridge.

ANNOTTO, Annatto, or **Arnatto,** a red coloring matter extracted from the outer part of the seeds of a Brazilian evergreen, called the *bixa Orellana*. Dissolved in an alkali, as a crude pearl-ash, its color changes to orange. It is used to color milk, butter, and cheese. Dyers, painters, and soap-makers also make use of it. Though employed only for disguising other substances, it is itself probably more adulterated than almost any other article of commerce. It has been purchased containing over 60 per cent. of chalk, and is often found contaminated with red lead, so that cheese colored with it has been made poisonous. Other substances usually mixed with it are turmeric, rye, barley, and wheat flour, sulphate of lime, salt, alkali, Venetian red, and copper.

ANNUITY, a yearly payment, subject to various conditions. The payment may be stipulated without regard to any contingency, in which case it is called an annuity certain. If limited in time, it is called a term or temporary annuity certain. If no limit is fixed, it is called a perpetuity. A contingent annuity is one of which the payment is limited by the occurrence of some future event, uncertain as to time, but more or less probable. It is temporary when it must cease at a fixed time, provided it has not already ceased by the previous occurrence of the contingent event. The consideration for insurance, as generally paid, is an example of contingent annuity, but is called premium. Annuities paid as reward for meritorious services are called pensions; and those paid for the use of real estate are called rent. —Though the term annuity implies a year as the interval between the payments, yet in practice it is made to include any series of equal or uniformly increasing or decreasing payments at equal intervals, as annual, semi-annual, quarterly, or monthly; and in mathematical theory the intervals may be infinitely small, when the annuity is said to be payable momently.—The most important contingency ever introduced into annuity contracts is that of death. A fixed sum which is payable at equal intervals during the entire life of a person is called a life annuity. If it depends on two or more lives, and is to cease on the death of either, it is called a joint life annuity. A survivorship annuity is one which so depends upon two or more lives, that it is to commence only when one or more begin to be survivors. These annuities may be temporary, or for the whole life, immediate or deferred; that is, the first payment may take place in advance or immediately after the occurrence of the contingency, or it may be deferred one or more of the equal intervals. The most important question in regard to any such series of payments is its present value. This would be easy to answer in regard to annuities certain, but for the interest of money. For if money earned no interest, the present value would be the sum of all the future payments, which in case of a perpetuity would be infinite. If we assume any perpetual rate of interest, the present value of a perpetuity at that rate is obviously the principal that will yield that interest; and this principal is always less in regard to a given interest as the rate is higher. Any term annuity certain may be considered as the early portion of a perpetuity. Hence the difference between the principal, P, which is the present value of the perpetuity, and the same discounted at compound interest for the intervals of the term *n*, at the assumed rate *i* $(P - \frac{1}{(1+i)^n} P)$, is the present value of the term annuity for *n* intervals. The subtractive quantity $(\frac{1}{(1+i)^n} P$, or v^nP as it is usually written) is called the reversionary value of the term annuity, or of the estate whose income is absorbed by its payment. Any annuity is said to be worth as many "years' purchase" as the times it is contained in its present value.—The present value of any life annuity involves a medical as well as a mathematical question. The mathematical solution, which comes first, is founded on an assumed rate of mortality, more or less worthy of confidence, according to its agreement with observed facts when taken in large numbers. This gives the value supposing the life in question possessed of the average vitality due to its age. Medical science will modify this result so far as it can determine a variation of the individual from the assumed average, though it has no means of fixing a definite or numerical variation. It is a common mistake to suppose that the present value of a life annuity can be found from the "expectation of life," or average after-lifetime at the given age, by finding the present value of an annuity certain for the term of that expectation. This can be true only when the assumed interest is zero. This popular error has been much fostered by life insurance companies publishing tables of "expectation," which can have no possible application to their business except by this erroneous method, and which, so applied, only prove their premiums too high. The only correct method of applying the rates of mortality and interest to ascertain the present value of any series of payments contingent on life, is to apply them separately to each and every possible payment. Each future payment must, in effect, be multiplied by the present value at compound interest of a dollar, or monetary unit, payable certain at that time; and this product must again be multiplied by the fraction, derived from the table of mortality, expressing the probability of the party being then alive to pay it. The sum of as many such products as there are possible payments is the present value of the life annuity. When only one or two lives are concerned, there are tables which abridge the operation to a narrow compass; but when there are three or more, the combinations become too numerous to admit of exhaustive tables, and mathematicians content themselves with methods of approximation to solve particular problems.—After the mathematical solution, which can only be as correct as the assumptions on which it is founded, comes the medical, weighing the special facts by which the individual case differs from the average or general type. The reason why the business of selling annuities to commence in a year or less is always unprofitable to an honest company, and why it is unprofitable to a government as a means of borrowing money, is that the medical selection is in favor of the buyer. On the contrary, companies dealing in policies of insurance, or selling annuities long deferred, succeed by a medical selection in their own favor.—The most valuable recent contributions to the basis for calculating life annuities are contained in the works of Chisholm, and the writings of Dr. Farr, in connection with the reports of the registrar general of Great Britain. Very valuable observations have also been made by Mr. Meech on the United States census of 1860, and by Mr. Elliott on the population returns of Massachusetts.

ANNUNCIATION, the announcement to Mary by the angel (Luke i. 30–33) that she should conceive and bear the child Jesus. In commemoration of this event, the church instituted the feast of the Annunciation, to be observed on the 25th of March. In old style this day commenced the year. Writers differ as to the time when this feast was instituted. Some throw it as far back as the 4th century, since there is mention of it in a sermon ascribed to Athanasius. Others think its origin is to be assigned to the 7th century, which is the most probable opinion, as the sermon of Athanasius is believed to be spurious.

ANODYNE (Gr. ἀν privative and ὀδύνη, pain), a term properly applied, not to medicines which relieve pain by removing its cause, but to those which merely diminish the conducting power of the nerves of sensation, or which render the brain less susceptible to or less conscious of pain. The principal medicines of this kind are opium, belladonna, and hyoscyamus, with their alkaloids, Indian hemp, ether, and chloroform. The last two are usually called anæsthetics, because they diminish the power of the brain to receive impressions from any external source. The use of anodynes is generally to be looked upon as the substitution of a lesser evil for a greater, and a habitual resort to them is always, if possible, to be avoided.

ANOINTING, an ancient custom of pouring aromatic oils on persons as a token of honor. It was employed in consecrating priests, prophets, kings, and the places and instruments appointed for worship. In the Old Testament, the anointed of the Lord is a person upon whom God has conferred a particular dignity, and whom he has appointed to a special ministry. The anointing oil was often a very costly preparation. Olive oil, spikenard, and myrrh were the more common materials. A very precious oil, the holy oil, was used in the service of the sanctuary, and could not be applied to any ordinary purposes. The Roman Catholic church has retained anointing as a symbol in its sacraments of baptism, confirmation, ordination, and extreme unction. In consecrating a church, the bishop anoints the walls of the edifice and the altars which are to serve in the celebration of the mass. Anointing with perfumed oil was in common use among the

Greeks and Romans as a mark of hospitality to guests, and modern travellers in the East still find it a custom for visitors to be sprinkled with rose water, or to have their head, face, and beard anointed with olive oil.

ANOKA, an E. county of Minnesota, bounded S. W. by the Mississippi river, and intersected by Rum river, one of its branches; area, 420 sq. m.; pop. in 1870, 3,940. The productions in 1870 were 27,390 bushels of wheat, 17,715 of oats, 36,838 of corn, 15,872 of potatoes, and 5,246 lbs. of wool, and 11,200,000 feet of lumber was sawed. Capital, Anoka, at the mouth of Rum river, 22 m. N. N. W. of St. Paul.

ANOLIS (*anolius*), a reptile of the saurian family, peculiar to America, belonging to that section of the iguanas which Cuvier distinguishes as having teeth on the palate of the mouth as well as on the interior jaw bones. Its body, legs, and tail are long and tapering. The fore legs are longest, having five toes furnished with sharp, hooked claws, with a sort of pad appended to the under side of the last joint, which increases the power of their hold on any substance over which they may chance to be walking. There is a large extent of loose skin extending from the chin to the belly, which when not distended forms a longitudinal fold under the whole lower surface of the animal. The anolis has a singular serrated or saw-edged crest along the spine and upper side of the tail, and the whole animal is covered with small, round scales, which give it a granulated appearance resembling the finest shagreen. The anolis seems in many respects to supply in the new world the place occupied by the chameleon in the old. Its colors change with the same or even greater rapidity, especially on the loose skin of the throat, which is constantly distended when the animal is actuated by strong passions, and in this state it assumes an endless succession of ever-varying hues. It frequents woods, coppices, and rocky places; climbs and leaps so swiftly and rapidly that its movements can hardly be traced; and, when overheated or fatigued, pants like a tired dog. It is a gentle, inoffensive creature, feeding on insects and flies, and is easily alarmed. There are six species, two of which belong to the United States, and the others to the Antilles and to South America. 1. *A. velifer* is of a beautiful ashy blue color, and is the largest of the family. Its body is about a foot long, and the tail a foot and a half. The crest extends along the top of the tail for half its length from the origin, and is supported by from 12 to 15 rays. It is a native of the West Indies. 2. *A. bimaculatus* is little more than half the size of the former species, is of a greenish blue color, clear on the head and upper parts, but variegated with brown on the body, tail, and extremities. It is found from Pennsylvania to the shores of the gulf of Mexico and in the Antilles. 3. *A. equestris* has scarcely any crest, and is nearly the size of *A. velifer*. 4. *A. bullaris* is not above half the size of *A. equestris*, with a reddish green throat, and very pretty. It is green in color, has a short muzzle spotted with brown, and, except in the absence of the crest or tail, is very similar to *A. bimaculatus*. It belongs to the Antilles. 5. *A. lineatus* is of a pure, bright green color, rather larger than the last species, and is marked along each flank with two parallel lines of oblong black spots; it is a native of different parts of South America. 6. *A. principalis* is a native of South Carolina, and is known as the green lizard. It is a beautiful greenish gold-colored reptile, particularly distinguished by a black band on the temples, and the elongated and flattened form of its muzzle.

Crested Anolis (Anolius velifer).
Green Carolina Anolis (Anolius principalis). Red-throated Anolis (Anolius bullaris).

ANQUETIL, Louis Pierre, a French historian, brother of Anquetil-Duperron, born in Paris, Feb. 21, 1723, died Sept. 6, 1808. He was an ecclesiastic, and published a history of Rheims (1756), a history of France (14 vols. 12mo, 1805), historical monographs on the times of Henry IV., Louis XIII., and Louis XIV., and a *Précis de l'histoire universelle* (9 vols. 12mo, 1797; 12 vols., 1801 and 1807), part of which was composed in prison during the reign of terror. His *Motifs des guerres et des traités de paix de la France* (1798) is praised for its evidences of profound knowledge of diplomacy and its sound judgment.

ANQUETIL-DUPERRON, Abraham Hyacinthe, a French oriental scholar, born in Paris, Dec. 7, 1731, died there, Jan. 17, 1805. He was educated for the church, but preferred to devote himself to oriental literature. In his enthusiasm for this pursuit he enrolled himself as a common soldier in the expedition to the French colonies in the East Indies, in 1755, chiefly for the purpose of discovering the ancient books of the Parsees. He visited Chandernagore, Surat, the coast of Coromandel, and was just about proceeding to Benares when the capture of Pondicherry forced him to return to France, where he arrived in 1762, without money, but with valuable oriental manuscripts. He was appointed interpreter of oriental languages at the royal library, was admitted to the academy of inscriptions and belles-letters, and in 1771 he published in French the first translation of the *Zend-Avesta* ever made in an occidental language, with an account of his travels and a life of Zoroaster.

ANSALONI, Giordano, a Sicilian Dominican missionary, died by torture at Nagasaki, Japan, Nov. 18, 1634. Hearing that in the Japanese islands Christians were persecuted with the utmost barbarity, he went with a Spanish missionary expedition to the Philippine islands, learned the Japanese language in a Chinese and Japanese hospital at Manila, and in 1632 went to Japan, where he spent two years in the disguise of a native priest. He was finally discovered and arrested at Nagasaki, where he was tortured to death. Another priest and 69 converts were put to death at the same time.

ANSARIES, or **Ansarians** (Arab. *Anseriyeh*), also called Nossairians, an Arab tribe or sect inhabiting the mountainous district between the northern part of the Lebanon and Antioch, Syria. This range, called the Ansarian mountains, is much lower than the Lebanon, not averaging more than 4,000 feet. Limestone is the prevailing rock, and thin oak forests cover almost the whole ridge. The Ansaries are to be found also in Antioch, Saida, Latakieh, and other towns and villages on the coast. Their chiefs live in Bahluleh, Simrin, and Safeta. Of their origin and early history little is known. They endeavor to conceal their doctrines from all foreigners, and only male adults are initiated. Among Moslems they, like the Druses, profess Mohammedanism. Their prophet Nossair taught that God has appeared 11 times in human form, in Abraham, Moses, Jesus, Mohammed, Ali, Hakem-bi-amr-Illah, and other imams; that he always encountered opposition and then returned to heaven, where he wrapped himself in a blue mantle, and at length retired to the sun, which is therefore worshipped by the Ansaries. They wait for the appearance of a Mahdi or Messiah, who will be the last of the 12 imams in whom the Deity assumes a human form. Like the Yezidis of northern Syria, they allow promiscuous intercourse of the sexes on certain festivals, and in performing their religious rites they are said to be very licentious. They believe in the migration of souls, which for the faithful is a progressive purification till they become stars; but those who neglect their religious duties, betray the mysteries, or deny the divinity of Ali, are doomed to transformations into Jews, Christians, Mohammedans, donkeys, dogs, and hogs. They have four degrees: *shamsi*, worshippers of the sun; *kamari*, worshippers of the moon; *klesi* or *kadami*, worshippers of women; and *shemali* (*shemal*, north; literally, northerners). They practise circumcision and ablutions, and pray three times a day under the open sky. Their chief religious festival is called the *Ghadir*. Their doctrines teach them benevolence, honesty, and patience in adversity, but they are thievish, superstitious, and ignorant, though very hospitable. Each community is governed by a *mokaddem*, who is almost wholly independent. They have frequently defended their freedom with great courage against Turkish and Egyptian pashas. During the crusades they were found in all parts of Syria and Mesopotamia. The accounts given of this sect by modern travellers vary, and must be received with caution. According to Mme. Audouard (*L'Orient et ses peuplades*, Paris, 1867), they are divided into three parties, considerably differing from each other. The most numerous of them worship a beautiful young woman, who is elected to the dignity of goddess every third year.—Among the Ansaries it is usual to reckon the sect of the Kadamisseh, who live east of them in several valleys of the Cadmus mountains. They keep apart, however, from the Ansaries, do not intermarry either with them or any other neighboring sect, and have their own religious customs. Like the Assassins of the middle ages, they call themselves Ismaelians.

ANSCARIUS, or **Ansgar** (Fr. **Anschaire**), **Saint,** the "apostle of the north," born in Picardy in 801, died at Bremen in 864. Educated in the old Benedictine monastery of Corbie, near Amiens, he was early transferred to a new one recently founded at Korvey on the Weser, where he distinguished himself as a teacher. When Harold of Denmark, who had been baptized in Mentz, returned to his country, he took with him as missionaries Anscarius and his colleague Audibert. Success at first attended their efforts, but after a time they, as well as the king, were expelled from the country. Anscarius in 829 penetrated into Sweden, where he obtained from the king, Biörn, permission to preach, and made many converts, returning to his monastery in 831. In the same year Pope Gregory IV. made him archbishop of Hamburg and apostolic legate, and to this appointment the bishopric of Bremen was afterward added. Pope Nicholas I. appointed him his legate to preach the gospel among the Swedes, Danes, and Slavs. He won the favor of King Eric of Jutland, and succeeded in preaching the Christian religion there in 862. In Sweden he reformed many disorders which had grown up among the new Christians. Anscarius was not indeed the first who attempted to propagate the gospel in northern Europe, but he was the first to firmly plant Christianity among the Danes and Swedes.

ANSDELL, Richard, an English painter, born in Liverpool in 1815. He is known chiefly as a painter of animals and field sports, although occasionally attempting a historical work, such as "The Battle of the Standard." Among his best pictures are a number on Spanish subjects. He has also worked in conjunction with Creswick, the landscape painter.

ANSELM, a saint and doctor of the Latin church, born at Aosta in Piedmont about 1033, died in Canterbury, England, April 21, 1109. His youth was dissolute, until, at the age of 27, he entered the Benedictine monastery of Bec in Normandy, of which in 1063 he succeeded Lanfranc as prior, and in 1078 became abbot. In 1092 he was invited to England, and in 1093 was consecrated archbishop of Canterbury as successor to his friend and master Lanfranc, since whose death in 1089 the see had been vacant. In this office he had several memorable conflicts with William Rufus and Henry I., especially on the subject of ecclesiastical investitures, and was deprived for a time of his bishopric, passing several years in France and Italy. Anselm is generally regarded as the earliest of the scholastic theologians. As a religious philosopher he had no superior in his own age, and few superiors in any age. His greatest works, and those which have won for him the surname of "the Augustine of the middle ages," are his treatise *De Concordia Prædestinationis*, and the treatise *Cur Deus Homo*, in which he illustrates the doctrine of satisfaction, which has since his time ruled in the theory of the atonement. The best and most complete edition of the works of Anselm is that issued in 1675 at Paris, under the direction of the Benedictine monk Gabriel Gerberon.

ANSON, a S. county of North Carolina, bordering on South Carolina, bounded N. by Rocky river, and E. by the Yadkin; area, 650 sq. m.; pop. in 1870, 12,428, of whom 6,951 were colored. The Yadkin furnishes abundant water power. The surface is hilly; the soil is good and well suited to cotton. The productions in 1870 were 39,928 bushels of wheat, 149,726 of corn, 46,851 of oats, 25,569 of sweet potatoes, and 4,311 bales of cotton. There are several cotton factories. The county was named in honor of Lord Anson, who owned a great deal of property here. Capital, Wadesboro.

ANSON, George, lord, an English admiral and navigator, born at Shugborough, Staffordshire, April 23, 1697, died June 6, 1762. He entered the navy when a boy, was made a post captain in 1724, and received the command of the Scarborough man-of-war. Between 1724 and 1735 most of his time was spent on the Carolina station, where he founded the town of Ansonburgh. In 1739 England declared war with Spain, and he was appointed to the command of a squadron which was to proceed to the South sea, and harass the Spanish trade and settlements in that quarter. The expedition, wretchedly equipped, heavily laden with private merchandise in spite of Anson's remonstrances, and some of the vessels unseaworthy, sailed Sept. 18, 1740. He lost part of his fleet off Cape Horn, a great part of his men died of scurvy, and he finally crossed the Pacific ocean with only a single ship. In consequence of these disasters, the original object of the expedition was abandoned, but Anson was enabled to explore the coasts and islands of the Pacific, and make important discoveries. Every coast and harbor he visited was carefully surveyed, and he made a large collection of Spanish charts and journals. With his single vessel he took Payta, on the coast of Peru, and a number of ships, among them the Manila galleon, laden with treasure. Throughout the voyage he showed great courage, prudence, and fertility of resource, besides tender care of his sick men and humanity toward his prisoners. He returned home with his prizes in June, 1744, having eluded the French channel fleet during a fog, and was soon afterward made rear admiral of the white and a commissioner of the admiralty, in 1746 vice admiral of the blue, and in 1747 of the red. He commanded the channel fleet in 1746–'7, and on May 3, 1747, captured off Cape Finisterre most of the French India fleet, consisting of nine ships, and carrying over 3,000 men and 420 guns. This achievement procured him a peerage as Lord Anson, baron of Soberton. He was first lord of the admiralty from 1751 to 1756, and again from 1757 till his death. In 1761 he was made admiral of the fleet, and soon afterward sailed from Harwich in the Charlotte yacht, to bring the future bride of George III. to England. Anson's "Voyage round the World," prepared by Benjamin Robins from materials furnished by the navigator (4to, London, 1748), passed through four editions the first year, and has been translated into many languages. His title expired with him, but his name was assumed by his nephew and heir George Adams, whose son was created Viscount Anson, and his grandson earl of Lichfield.

ANSON, George, British commander-in-chief in India, born in London, Oct. 13, 1797, died of cholera at Kurnaul, May 27, 1857. He was the second son of the first Viscount Anson, and uncle of the first earl of Lichfield. At an early age he entered the Scots fusilier guards, with which regiment he served at the battle of Waterloo. In 1825 he was placed on half pay with the rank of lieutenant colonel; in 1851 he became major general. He sat in parliament for many years as a whig. In 1855 he was appointed commander-in-chief in India, where he held the local rank of general. He died soon after the sepoy rebellion began.

ANSONIA, a manufacturing village in the town of Derby, New Haven co., Conn., on the E. bank of the Naugatuck river and on the Naugatuck railroad, 9 m. W. N. W. of New Haven; pop. in 1870, 2,749. It was established by Phelps, Dodge and company of New York, and named from Mr. Anson G. Phelps. It has 11 rolling mills, 2 founderies, white lead works, woollen mills, extensive clock, hoop skirt, and other factories, good public water works, a bank, several churches, and many fine residences. The fall in the river at this point affords excellent water power.

ANSPACH (Ger. *Ansbach*, formerly *Onolzbach*; Lat. *Onoldum*), a town of Bavaria, capital of the government of Middle Franconia, and formerly of the principality of Anspach-Baireuth, which gave the title of margrave to a branch of the house of Brandenburg. The town is situated at the junction of the Holzbach with the Lower Rezat, in the government of Middle Franconia, 24 m. W. S. W. of Nuremberg; pop. in 1871, 12,635. It has a beautiful castle, a picture gallery, a library, manufactures of surgical instruments, cutlery, cotton, woollen, and silk stuffs, leather, earthenware, white lead, tobacco, cards, parchment, &c., and a trade in wool, flax, and grain. It owes its origin to the monastery of St. Gunibert, founded here in the 8th century.—The last margrave, Christian Frederick Charles Alexander, son of the duchess of Baireuth, the sister of Frederick the Great, and nephew of Queen Caroline, the wife of George II., was born in 1736 and died in 1806. He spent most of his life in travel and gallantry, married the celebrated Lady Craven (see next article), and left a name renowned in the scandalous chronicles of the continent. In 1790 he sold his principality to Prussia for about $800,000.

ANSPACH, Elizabeth, margravine of, youngest daughter of the fourth earl of Berkeley, born in December, 1750, died in Naples in January, 1828. She was married in her 17th year to Mr. Craven, afterward earl of Craven. She then had beauty, fascinating manners, and much talent. After having been married 13 years, during which time she had seven children, she separated from her husband, proceeded on a very extensive tour, visiting Italy, Austria, Greece, Turkey, Poland, and Russia, and was received with *éclat* by several crowned heads. Finally she went to reside at Anspach, where she established a theatre, wrote plays and directed their performance, and became an important personage with the margrave, whose wife was generally confined to her chamber by ill health, and soon after died. Lady Craven continued a visitor at Anspach, and accompanied the margrave on his excursions to other courts and his tours through Italy, England, and Portugal. Lord Craven died in September, 1791, and his widow was soon afterward married at Lisbon to the margrave, in a very ostentatious manner. Returning to England, her three daughters refused to see her, "out of respect to their father," her eldest son neglected her, and her brother, Lord Berkeley, reproached her for marrying again so soon after her late husband's death. Her reply was, that "it was six weeks after Lord Craven's decease that she gave her hand to the margrave, which she should have done six hours after had she known it at the time." Queen Charlotte intimated that she could not be received at court, and refused to grant an audience to the margrave, who had settled in England, purchasing Brandenburg house, in the suburbs of London, subsequently so well known as the residence of Queen Caroline. In 1802 the margravine received a patent from the emperor of Germany, creating her Princess Berkeley; but the queen of England still declined seeing her. In 1806 the margrave died, aged 70, leaving £150,000 to his widow. After wandering over Europe, she finally settled at Naples. Her latter years, spent in literary retirement, were respectable. She wrote several farces and musical pieces, and was an accomplished composer. She published "Memoirs of the Margravine of Anspach, formerly Lady Craven, written by Herself" (2 vols., London 1825), which is only an apology for her life. Among her other works were two volumes of travels in Europe and the East, in letters to the margrave before their marriage.

ANSTED, David Thomas, an English physicist, born in London in 1814. He was educated at Cambridge, and has been professor of geology at King's college, London, and the college of civil engineers at Putney. During the last 25 years he has been principally engaged on works illustrating the application of geology to engineering and mining. Besides several treatises on geology and related subjects, he has published "Scenery, Science, and Art" (1854), "The Channel Islands" (1862), "Correlation of the Natural History Sciences" (1863), "The Ionian Islands" (1863), and "Physical Geography" (4th ed., 1870). He has also contributed largely to the scientific reviews; and while vice president of the geological society he edited several volumes of their quarterly review. As a consulting engineer he has a high reputation.

ANSTER, John, an Irish poet, born at Charleville, in the county of Cork, about 1798, died in June, 1867. He was educated at Trinity college, Dublin, and published in 1819 a volume of "Poems and Translations from the German." These were favorably reviewed in "Blackwood's Magazine," to which some of them had been originally contributed, and gained for him the friendship and encouragement of Coleridge. By his advice, Anster completed his version of Goethe's "Faust," specimens of which had already appeared in "Blackwood." Mr. Anster was called to the Irish bar in 1824, and was for some time regius professor of civil law in the university of Dublin. He published a second volume of "Poems and Translations" in 1837, and an "Introductory Lecture on the Study of the Civil Law" in 1849.

ANSTEY, Christopher, an English satirical poet, born at Brinkley, Cambridgeshire, Oct. 31, 1724, died at Chippenham in 1805. He is only remembered for his amusing satire called "The New Bath Guide," the profit on the sale of which was declared by Dodsley to be greater than he had ever gained in the same period from any other book. The principal targets for the writer's shafts are physicians and Methodists. Smollett borrowed largely from this poem in "Humphrey Clinker."

ANSTEY, Thomas Chisholm, an English author, born in London in 1816, died Aug. 12, 1873. He was called to the bar in 1839, removed to Ireland, was member of parliament for Youghal from 1847 to 1852, and from 1854 to 1858 was attorney general at Hong Kong. He published several works, the most important of which are "A Guide to the Laws of England affecting Roman Catholics" (1842), and "Guide to the History and Constitution of England."

ANT, an insect belonging to the family *formicidæ* (or *formicariæ*, Latreille), of the suborder *hymenoptera* or membranous-winged insects. There are numerous genera and several hundred species known and described from various parts of the world. Some species have been famed from remote antiquity for the intelligence displayed in their labors. The habits of others are as yet insufficiently studied, or where ascertained exhibit a lower grade of development. Many species, which are common to the temperate regions of both continents, agree in the following respects: they live in communities consisting of hundreds and even thousands of individuals, of which the fertile females are the largest, the males next in size, and the infertile females (commonly termed nurses or workers, and improperly neuters) the smallest. The last, however, in some species are of at least two different sizes, which are respectively known as the soldier or major and the minor worker. These differ especially from the fertile females in the lack of development in the ovaries and wings. All of these forms, however, are hatched from eggs, not observably differing, which are not glued singly to one spot, as in the honey-bee, nor lodged irremovably in cells of clay, as in the case of many wasps, but are scattered about in parcels of three or more, loosely attached to each other, so that they can be separated and carried from place to place at pleasure, during the process of hatching. This is during that season the principal duty of the female and of the nurse ants, as it is afterward to do the same by the large cocoons. This transportation of the eggs has, from their resemblance, led to the erroneous idea that ants lay up grain for winter use; whereas many species never feed at all during the winter, remaining torpid. The eggs are exposed by the worker, or by the female when alone, to the rays of the sun during the early morning, covered from its too powerful influence during the extreme heat of the day, and removed beyond the influence of cold or wet by night. As soon as the larvæ or grubs are hatched, they are treated in the same manner. Until their maturity the grubs, which are necessarily voracious, since they have not only to take up material sufficient for their own growth, but for the formation of the substance whence to spin their cocoons, are fed by the nurse ant, or by the female when alone, with a liquid disgorged from the stomach of the parent. When a female has founded her colony alone, she must be at work early and late, in order to collect sustenance sufficient for herself and for the support of the 20 or more greedy grubs. As soon as the grubs have attained maturity, if of those species which are destitute of stings, they generally spin their cocoons, of a membranous texture and a brownish-white color, which considerably resemble barleycorns. The cocoons are treated precisely as were the eggs and the grubs, in their exposure to proper temperature, and their removal from undue extremes of heat or cold, until they are ripe for their second birth, when the young ants are cut out of their cerements by the mandibles of the nurse ants. Early in the pairing season, both males and females are to be seen in great numbers in all the ant hills, provided with glistening wings, mixed with the wingless workers, who keep diligent watch over them, posting regular sentries and never allowing them to escape beyond the limits of the colony without a guard, several of whom may at times be observed dragging back a deserter by the limbs. There always seems to be a disposition among the winged ants to desert the colony, but the workers never accede to this truant disposition, but resist it to the utmost, nor ever yield unless the breeders become too numerous to be fed or guarded by them. The actual copulation does not take place in the ant hills, but at some small distance from them, and not infrequently in mid-air; and scouts are always on the lookout to drag back the fertilized females to the principal settlement, or to form small independent parties, which seize a female and found a colony on their own account. Sometimes it will happen, so great is this propensity to ramble on the part of the females after their impregnation is complete, that an original settlement is wholly deserted, owing to the workers who have gone off in pursuit, if they have been led too far from home to care about return, forming fresh colonies in whatever place they succeed in capturing a fugitive queen. Occasionally, when an impregnated female escapes by herself, she lays her eggs and establishes her own colony, unassisted by the workers; in which case she herself performs the duties to the eggs which would otherwise be rendered by the nurse ants. The males, after their duties of impregnating the females are performed, are permitted to stray away after their own pleasure, without any effort on the part of the workers to retain them, and die shortly afterward. It was formerly supposed that all ants procured wings at a certain stage of their growth; but it was discovered by the younger Huber that in the males and females they are gradually developed from the first day of their existence, until, when their purpose has been fulfilled, they are dislocated and cast aside like worn-out clothes. Besides the labors of the working ants, or neuters, already described, they have the task of forming the streets, chambers, and habitations of the colony, repairing them, thatching them, fortifying them against the weather by various operations of mining, masonry, or carpentry, performed with wonderful skill, and under circumstances which prove the possession of some powers or senses beyond our comprehension. It is, however, noticeable that the possession of elbowed or flail-shaped antennæ is almost invariably associated with a high degree of intelligence, evidenced by constructive ability, command of language, &c., as in the bees, wasps, and ants.—The most remarkable of the mining ants are the *formica sanguinaria* of Germany and the *F. cæspitum* or tuft ant of England, which perforate long galleries in the clay, removing all the rubbish, and building buttresses to support their work, by aid of their mandibles only, and then overcasting the whole with a thatch of grass stems and heather against wet or cold. The most common of the mason ants are the red and yellow field ants, which erect superficial habitations; first raising pillars, then springing arches from pillar to pillar, and lastly erecting above them the loose piles of soil which we know as ant hills. Their materials for these edifices are the soil, sand, and clay, kneaded with rain water into a tenacious mortar, which is besmeared over wheat stalks, blades of grass, or any casual supports which they can find. The carpentering ants are those which, like the emmet, *F. fuliginosa*, of Europe, and the *F. caryæ* or walnut ant of the United States, perforate their cells in the solid timber of growing trees, boring or chiselling them out, side by side, at all sorts of divergent curves, and sometimes at right angles one to the other, apparently in conformity with no plan, and carried on in accordance with the will of the excavator only, until they come so closely into relation with another series of workings that the divisions between them are not thicker than ordinary letter paper, when they instantly terminate, or turn aside, without in any known instance perforating the partition between the several galleries.—There is a considerable variety in the food of ants. A favorite article of diet is honey in some of its modifications, but more especially the secretions of the various species of aphides, known as honey dew, which is found besmearing the leaves of plants, and which is so injurious to the vegetables when it becomes thick enough to obstruct the pores; and it is on this account that wherever aphides abound, ants will ever be found attending on their motions. Some varieties of ants are in the habit of capturing root-sucking aphides and imprisoning them in their cells, with a view to feeding on their honey dew. In this case the ants take the same care of the "root lice" as they do of their own young. Many ants subsist largely on decaying animal and vegetable matter, rendering themselves very serviceable as scavengers, and as assistants to the naturalists in the preparation and cleaning of the skeletons of small animals for museums. The allusion in Prov. vi. 6–8 to the habits of an Asiatic species, is also applicable to a Texan ant, *myrmica molefaciens*, which is reported by observers to not only feed upon a certain grain, the seed of *aristida stricta*, but also to plant, cultivate, and harvest it, laying it up in dry cells "against the rainy day." This species, sometimes called the "agricultural ant," builds "paved cities, constructs roads, and sustains a large military force." *Myrmica molesta*, the "troublesome" or the "little red ant," is of a reddish yellow, the worker measuring only $\frac{6}{100}$ of an inch in length, and is the great pest of houses in many parts of the United States. In other places a large black ant (*F. Pennsylvanica*) takes its place, destroying decaying timbers, books, provisions, specimens of natural history, furs, and other property. Very small ants abound in South America, whose bite is so sharp that they are called fire ants; they are very annoying and destructive, making up in numbers what they lack in size.—Some species, especially the wood ant, *F. rufa*, and the Amazon or warrior ant, *F. rufescens*, as well as the sanguinary ant, *F. sanguinaria*, are literally slave-holders. They sally out in great swarms on belligerent and predatory excursions, for the purpose of capturing and bringing home to their own colonies the eggs and cocoons of other tribes, generally of the dusky ant, *F. fusca*, which, when hatched in the fortresses of the victors, are compelled to life-long labor. Independent of the annual migratory disposition of all the species, for the purpose of forming new colonies, sudden impulses, probably connected with facility of obtaining food, at times appear to seize on certain varieties of ants, leading them all to take wing simultaneously. Strange relations may be found in the "History of the Berlin Academy" for 1749, in the German "Ephemerides," and in the *Journal de physique* for 1790, of vast clouds of ants, darkening the air, and having a curious intestine motion, like that of the aurora borealis, unconnected with their line of flight, being seen at divers places, and, when they fell, literally covering the earth, so that one could not tread without crushing them at every footfall. For particulars concerning the habits and ravages of the great white ant of the tropics, see TERMITES, for that insect is not properly an ant. Du Chaillu has graphically described the formidable legions of the Cashikonay ant of Africa, before which all animals flee.—See the works of Baron de Geer and the younger Huber, Packard's "Guide to the Study of Insects" (Salem, 1868 *et seq.*), and Fitch's "Reports on the Insects of New York."

ANTACIDS, certain drugs used to neutralize acid, either in the alimentary canal or circulating in the blood. For the former indication, the carbonates and bicarbonates of soda and potassa, lime water, chalk, and magnesia with its carbonate, are used. The symptom which they temporarily relieve is, however, often more efficiently treated by regulated diet or by mineral acids. For the second purpose we have, besides the alkalies and their carbonates, including lithia, which is weight for weight the most powerful, the salts formed by them with acetic, tartaric, and citric acids. These acids, when in combination with alkalies, take up in the blood more oxygen, forming carbonic acid, which forms with the bases bicarbonates; so that the alkalization of the blood is attained without the local gastric troubles which might attend the administration of the caustic or carbonated alkalies in equivalent doses. The acetate of potassa, or corresponding salts, are largely used in the treatment of acute rheumatism where they render the urine alkaline. They also considerably increase its quantity.

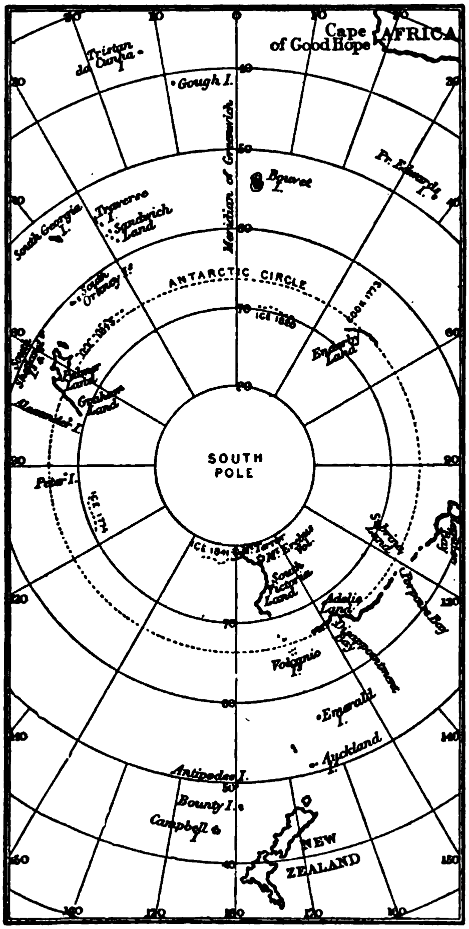
ANTÆ, in ancient geography, a Sarmatian people, between the Dniester and the Don, a branch of the Slavic Venedæ or Wends. Justinian overcame them when he caught them in the Roman territory, and gave them new abodes on the other side of the Danube, that they might be a rampart against the Huns. From them Justinian took his title of Anticus.

ANTÆUS, a mythological giant of Libya, son of Neptune and Terra, a mighty wrestler, and invincible while he continued in contact with the earth. Whoever visited Libya was bound to wrestle with him, and with the skulls of the vanquished, who were all slain, he erected a temple to Neptune. Hercules overcame him by lifting him off the earth, and strangling him in the air.

ANTALCIDAS, a Spartan, who, at the end of the Corinthian war, was sent on an embassy to Tiribazus, governor of Sardis, to negotiate a peace with Persia. He succeeded, and the peace, concluded in 387 B. C., with the concurrence of several Grecian states, was called after his name. It excited universal indignation throughout Greece, for Sparta had sacrificed to the Persian monarch the general interests of Greece in order to gratify her jealousy of the Athenians and Thebans. On being sent again to obtain the promised subsidies from the Persian king, he was tricked by the orientals, and fearing the popular indignation at home, he starved himself to death.

ANTAR, properly **Antarah,** an Arabian prince and poet of the 6th century, author of one of the *Moallakat*, the seven poems suspended on the Caaba at Mecca. A copy of a work called "Antar," celebrating the exploits of the prince, is in the imperial library of Vienna; and in the catalogue of the books written by Von Hammer there is some account of this romance. The legends of his exploits appear to have been embodied in a book and considerably enlarged by Asmai or Osmay, at the court of Haroun al-Rashid. He appears to have been aided in this by Yohainah and Abu Obeidah. The copy translated by Mr. Terrick Hamilton, oriental secretary to the British embassy at Constantinople, was procured at Aleppo, and is comprised in a smaller form than any other as yet sent to Europe. The voluminous work had, it appears, been curtailed of many of its repetitions and much of its poetry by some learned inhabitants of Syria, and was therefore called the *Shamiyeh* or Syrian Antar, in contradistinction to the original large work, which was called the *Hejaziyeh* or Arabian Antar. Though usually written in a continuous form, the story may very properly be divided into three parts. The 1st reaches to the marriage of Antar and Ibla; the 2d includes the period when the hero suspends his poem at Mecca; the 3d comprises the death of Antar and most of his comrades and relatives. Von Hammer, who twice read through the original, declared it to be "more interesting than the celebrated 'Thousand and One Nights;'" and Sir William Jones says: "I have only seen the 14th volume of this work, which comprises all that is elegant and noble in composition. So lofty, so various, and so bold is its style, that I do not hesitate to rank it among the most finished poems." With the Arabs it is a standard work. It is certainly one of the most ancient books of Arabian literature. Its language is uncommonly pure, equally remote from the harshness of the earlier or the conceits of the later authors.

ANTARCTIC DISCOVERY. The ancient geographers, among others the Greek Ptolemy, supposed a continent to exist near the south pole, and to extend to a great distance around it. On nearly all maps published before the middle of the last century, this continent is vaguely given as "Terra Australis Incognita." Captain Cook, by his second voyage, first threw doubt upon this theory. He was everywhere prevented by large masses of ice from reaching any high southern latitudes, and he could discover no land. In the few cases in which he passed beyond the Antarctic circle he reached only 71° 10′ S. latitude. In 1819 the South Shetland islands were seen but not visited by Capt. William Smith, the commander of a merchant vessel, driven far to the south in trying to round Cape Horn. In 1821 Trinity land, lying S. of the South Shetlands, in about lat. 62° S., was discovered by Howell, an Englishman; Palmer's land to the westward of Trinity land, forming a part of the same coast line, by Palmer, an American; and still further to the south and west the Russian Bellinghausen found Alexander's land. Weddell, the next English explorer, made no discoveries of land, but reached lat. 74° 15′ S. Enderby's land, lat. 67° 30′ S., long. 50° E., and Graham's land, a still further southwestern extension of Palmer's land, were discovered in 1831 and 1832 by Biscoe, who circumnavigated the southern ice region, an expedition having been fitted out for the purpose by Messrs. Enderby, merchants of London. In 1837 and 1838 Dumont d'Urville and Balleny made comparatively unimportant explorations; and in 1839 the French and American governments each sent out an expedition for a voyage of discovery in the Southern ocean. Dumont d'Urville commanded the French ships, and Lieut. Charles Wilkes the United States fleet of four vessels. On Jan. 16, 1842, Wilkes's officers discovered land from the masthead in about lon. 160° E., lat. 61° S. The expedition followed the indications of land to the westward for several days, and afterward for several weeks sailed along an immense ice field, which Wilkes thought to be a continuous barrier lying along the coast of an antarctic continent. As he saw land only at a few widely separated points, his inference that there existed a continuous coast line is one that greatly needs confirmation; islands lay all about his course a little further to the north, and they may easily have been the only interruptions the solid ice floe found to the south. The French expedition under D'Urville also discovered a considerable extent of coast in the same quarter, and named it Adélie; but he succeeded no more than Wilkes in establishing the fact of its continuity for any great distance. It is now generally conceded that it would be rash to assume from the results of these two expeditions that the existence of a great antarctic continent is proved.—In January, 1841, Capt. James Clarke Ross, who commanded an English expedition in the Erebus and Terror, discovered a line of coast trending southward from a point near lat. 70° 41′ S., lon. 172° 30′ E. Here were mountains 9,000 to 12,000 feet high, of volcanic origin; one, Mt. Erebus, in lat. 77° 32′ S., lon. 167° E., was active, and near it was an extinct crater which Ross called Mt. Terror. The whole line of coast discovered by Ross was steep and rocky, and the land he saw (Victoria Land) was, like almost all that seen by the other explorers, entirely bare.—Since 1841 no important discoveries have been made in the antarctic seas.



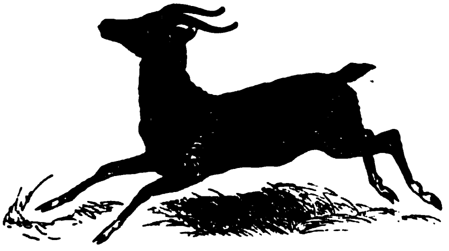
ANTARCTIC OCEAN, and **Antarctic Circle.** See POLAR SEAS, and POLAR CIRCLES.

ANT-EATER, the popular name of the South American species of the old genus *myrmecophaga*, of the edentate order of mammals, from the principal food of these animals. The ordinal characters are given under EDENTATA. The South American ant-eaters are covered with hair; the scaly ant-eaters of the old world are described under PANGOLIN. None of them have any teeth, and the plantigrade anterior feet are armed with enormous claws, bent downward and inward toward the palm, so that the animal walks on the outer edge of the foot. In this way the points are kept unbroken, serving as admirable instruments for tearing down ant hills, though they render the gait of the creature very slow and awkward. The bones of the jaws and nose are elongated into a kind of tube, nearly cylindrical, at the end of which is the small circular mouth, from which is protruded the long tongue covered with a glutinous saliva by which its food is captured. The great ant-eater or ant bear (*myrmecophaga ju-*

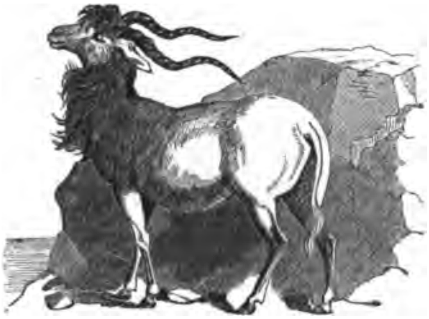
Great Ant-Eater (Myrmecophaga jubata).

bata), the tamanoir of the Portuguese, is about 4 feet long, with a bushy tail of 2½ feet more, the head being more than a foot long; the height at the shoulder is about 3½ feet, and at the croup 5 inches less. The claws are 2½ inches long, sharp-pointed, with cutting edges, but so directed that they are comparatively useless as weapons of defence or offence, and applicable only to the motions of tearing down ant hills; there are 4 on the fore feet and 5 on the hind. The tongue may be protruded to the length of 18 inches. The hair is long and coarse, brown mixed with gray at the head, and with white on the body and tail; the throat is black, with a broad stripe of this color, bordered with a narrower white one, running over the shoulders to the rump; arms and thighs silvery white, and hind legs black; breast and under parts brown. The claws when not in use are folded against a callous pad in the palms and soles. Though large and powerful, it is very stupid and inoffensive, and allows itself to be overpowered by the meanest enemies, which it could easily hug and tear to death, did it know enough to exert its great strength. It is wholly terrestrial, unable to climb trees from the structure of the claws and the absence of prehensile power in its uncommonly plumy tail; it makes no burrow, covering its body when at rest by the tail, which, with its long mane, makes the creature resemble a bundle of coarse loose hay. The female has a single young one, which she carries on her back long after it can provide for itself. Its food consists exclusively of ants; it obtains them by tearing open the hills, and drawing its glutinous tongue over the insects, at the rate, it is said, of two protrusions in a second. The flesh of the ant bear is black and of a musky flavor, but it is eaten by the Indians and negroes, and at times even by the European colonists. It is a native of South America, from Colombia to Paraguay, and from the shores of the Atlantic to the foot of the Andes; but it is nowhere a numerous species, being rarely seen even in its native regions. Like all animals using a purely insect diet, it is capable of enduring a total deprivation of food for almost incredible periods.—The tamandua, *M. tamandua*, does not exceed the size of a large cat. Its head is less disproportionately long, but is of the same cylindrical form with that of the larger animal, with which also correspond the formation of its anterior and posterior extremities, the construction and number of its toes, and the shape and form of its claws. The most remarkable difference between the two animals lies in their tails, that of the tamandua, which is a purely sylvan animal, living exclusively in trees and never found on the ground, being bare on the inferior side and of singular prehensile power. The hair over the whole body of the tamandua is uniform, short, crisp, and shining, a sort of silky wool standing out from the body; and it varies much in color in different individuals. The female has but two pectoral mammæ, and bears but one young one at a birth, which is of a light straw color and very ugly. The tamandua feeds on termites, ants, honey, and even bees, which in those countries make their hives in the topmost branches of the forest trees, and are stingless. It is a native of tropical America.—The little or two-toed ant-eater, *cyclothurus didactylus*, is not larger than the common squirrel. It has but four toes on its hind feet, and two on the fore feet. Its whole length, from the snout to the insertion of the tail, is but 6 inches; the length of the head is not quite 2 inches, while that of the tail is about 9. In general form it resembles the tamandua, but its muzzle is shorter and less tapering. Its ears are short and drooping, and are nearly concealed among the fur, which is long on the head and cheeks. The hair on the body and sides is long, soft, and glossy, much shorter on the tail, of a uniform light straw color, tinged with maroon along the back, where it has a strongly marked line. The tail is bare of fur at the under surface toward the end, and is very prehensile. The ribs are very broad and flat, overlapping each other. It lives in trees, having many of the habits of squirrels; it feeds on the larvæ of wasps and other insects, which it picks out of their nests with great dexterity. Like other ant-eaters, it is nocturnal in its habits, being fond of sleeping by day with its tail securely twisted around a branch. It has four mammæ, two pectoral and two abdominal, and bears but one offspring at a birth. Its native countries are Guiana and Brazil; further south it is unknown.

ANTELOPE, an animal of the family *antilopeæ*, ruminating mammalia, with hollow horns, conical, bent back, cylindrical or compressed, ringed at the base. The occipital plane forms an obtuse angle with the frontal plane. The core of their horns is thin, consisting of a dense bone, often with a clear sinus at the base within. Teats two or four. Feet pits in the hind feet, and generally in the fore feet also. Perhaps the most certain characteristic of the antelopes is the cylindrical and annulated form of their horns, which are never angular, or provided with prominent longitudinal ridges, like those of the sheep and goats. They are also generally distinguished by having the lachrymal sinuses peculiar to the solid-horned animals of the cervine family, and possessed by the antelope alone of the hollow-horned ruminants, though not by all the species. In other respects, the different species of antelopes vary as widely as can be conceived. Many approach the deer so closely that the hornless females of the two families can hardly be distinguished apart; although the difference would appear on dissection, the true solid-horned deer being possessed of neither gall bladder nor gall duct, which belong to all the hollow-horned ruminants. They are the fleetest, as they are the most beautiful and most graceful of quadrupeds. They are, generally speaking, both gregarious and migratory, occasionally uniting in vast herds. Africa is the headquarters of the antelope family in regard to variety, beauty, and numbers. Madagascar and Australia possess no antelopes; Hindostan and Further India have several varieties; western Europe and America each but a single species.—Originally, all species of antelopes were referred to a single family; but they are now distinguished into two great divisions: the antelopes of the fields, whose nostrils are smooth and free from hairs, and the antelopes of the desert, which are bearded and have bristly muzzles. The antelopes of the fields are again subdivided into three groups: the true antelopes, which have a light, elegant body, slender limbs, small hoofs, short tails, lyrate or conical horns, placed above the eyebrows; the cervine antelopes, with short, deer-like bodies, strong, slender limbs, long tails, cylindrical at the base, with the hair longer at the ends, and muzzles like those of the cervine ruminants; and the goat-like antelopes, which have a short heavy body, strong hoofs and false hoofs, very short tail, flat and hairy above, and recurved conical horns.—Of the true antelopes, the most remarkable are the gazelles of Egypt, Barbary, and Turkey in Asia; the Ariel gazelle of Egypt and Kordofan; the pallah, *antilope æpyceros melampus*, of southern Africa, with its annulated, lyrate horns, and its sleek hide, painted with brilliant rust color and white, divided by coal-black lines; the common antelope of India, *A. cervicapra;* the madoqua, *A. saltrara*, the smallest of all horned animals, not exceeding a hare in size; the steinbok, the ourebi, the grysbok, the klipspringer, and the bush goat, with the red reed buck, the water buck, and the sable antelope, of southern Africa. The red reed buck (called rietbok in the Dutch settlements) is about five feet high and five long; its color is gray above and white beneath. The sable antelope, a very rare and beautiful animal, is one of the noblest types of the genus; its back and sides are black, and its belly white; its horns are more than three feet in length, and are covered with bold ridges.—Of the cervine antelopes, by far the most remarkable are the gemsbok, *oryx gazella*, and the oryx, *oryx leucoryx.* The former stands 8½ feet high at the shoulder, with long straight horns, annulated at the base. His hide is of a deep blue-gray above and snow-white below, divided by marked lines of jet black. Even the lion seldom dares attack him. The oryx is a native of Nubia and Senegal. Another cervine antelope, not far inferior in size to the last, is the addax of Senegal, which has preserved its name unaltered since the days of Pliny. A

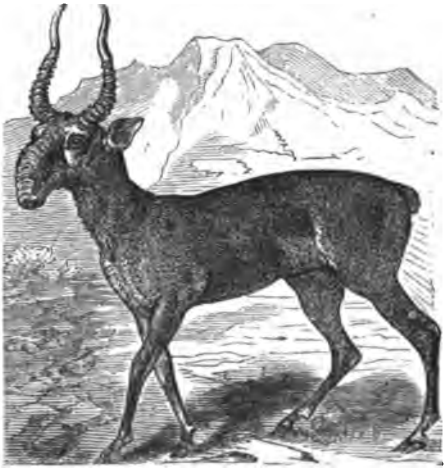


Red Reed Buck (Eleotragus arundinaceus).



Addax nasomaculatus.

Sable Antelope (Aigocerus niger).



Siberian Antelope (Saiga Tartarica).

species less familiar than either of those just named is the Siberian antelope (*saiga colus* or *Tartarica*), an animal inhabiting the region of the Caucasus, northern Persia, and Siberia. It is of medium size, resembling a deer in form, and has a peculiarly curved forehead and face. Its horns are of a light color and semi-transparent, and are much valued. The animal is gregarious and migratory in its habits.—Of the goat-like antelopes there are several of the oriental species; but the two most conspicuous are the European chamois, or antelope of the Alps, *rupicapra tragus*, resembling a goat without a beard, with short erect horns, suddenly curved backward at the tip, and coarse hair, beneath which lies a close coat of wool (see CHAMOIS); and the American prong-horn, *A. Americana*, which has considerable affinity to the chamois; its horns only differ from that antelope's in turning inward at the tip, and in having a short anterior, medial prong. The winter coat of this antelope differs from that of any other known animal; the hairs, which stand out to the length of two inches at right angles to the body, being tubular, like the quills of a bird, and nearly as brittle as glass. This antelope is fully described in Dr. Richardson's *Fauna Boreali-Americana*.—The antelopes of the desert are divided into two groups, the equine antelopes and the bovine antelopes. Of the equine antelopes there are but two species: the gnu, *A. gnu*, of South Africa, called the *wildebeest* by the Boers, which is nearly of the size of the ass, and has precisely the body, neck, mane, tail, and paces of a small horse, with the limbs, hoofs, and horns of an antelope; and the brindled gnu or gorgon, *catoblepas gorgon*, called by the Boers the *blauw wildebeest*, of the same country. (See GNU.) The bovine antelopes are the *A. bubalis* of northern Africa, equal in size to the largest stag, called by the Arabs *bekker-el-wash*, or the wild ox, the hartebeest, the blesbok, the bontebok, and the sassabee of southern Africa; the korrigum of Senegal; and the doria, or gilded antelope, of western Africa.—To these, which complete the list of antelopes as scientifically distinguished, may be added the highly interesting group of *strepsiceræ*. This group of antilopean ruminants includes the koodoo, *strepsiceros kudu*, which is fully 4 feet high at the shoulder, with horns nearly as long as the male is high, reflected in a beautiful sweeping spiral of 2½ turns; the eland, *oreas canna*, which is as large as a horse, weighs from 7 to 9 cwt., unlike most antelopes is always fat, and is said to furnish meat superior to beef (see ELAND); and the great nil-ghau, *portax tragocamelus*, one of the largest of antelopes, having much the character of the ox, with the horns, head, and muzzle of an antelope, the flat compressed neck of a horse, with a thin erect mane, increasing into a tufted bunch on the shoulders, and a singular beard-like tuft of stiff hair growing out of the middle of its throat, peculiar to itself alone. Its fore legs are somewhat longer than its hind ones, and its withers rise so much as to give it the appearance of having a hump. Its color is deep slaty blue, with a white spot on each cheek, and a large white patch on the throat. It is a native of the deep forests of India, where it is a vicious and dangerous animal, but it has been taken to England, where it lives and breeds.

Prong-horn (American Antelope).

ANTENNÆ, horn-like members on the head of insects and crustaceous animals. The antennæ are commonly called feelers, but their functions are not understood. In insects they are two in number; in crabs and lobsters there are more than two. The antennæ of insects are usually composed of minute articulated rings, containing nervous threads, muscles, tracheæ, and cellular tissue, forming organs of sensation, motion, and respiration. In most orders the articulations amount to 10 or 11 in number, although they are much fewer in some species, while in others they reach even to 150. The length of the antennæ does not depend on the number of articulations, as they are often long when of only three or four pieces, and the reverse. They are inserted on the front of the head in the region of the eye, and connected by means of a ball and socket. The distinction of sex in some species is marked by the peculiar formation of the antennæ. In moths the antennæ of the male are of more simple construction than those of the female. In moths and beetles they are much longer than the body, while in the common house fly they are comparatively short. Linnæus and Bergman supposed them to be organs of touch, and they were thence termed feelers; but M. Straus-Dürckheim is of the opinion that the antennæ are the insect's organs of hearing. Professor Bonsdorf, of Abo in Finland, and other naturalists, have adopted the same opinion. The younger Huber attributed to ants the use of the antennæ in a sort of language, which he terms the "antennal language," understood not only among ants themselves, but also among the aphides, which furnish the honey-dew on which ants feed.

ANTENOR, a Trojan prince, son of Æsyetes and Cleomestra, and one of the wisest among the elders of Troy. He counselled his fellow citizens to give Helen up to the Greeks. It is said that, having been sent to negotiate for peace with Agamemnon, he concerted with him and Ulysses a plan for delivering up the city; and when Troy was taken the skin of a panther was hung up at his door as a signal to the Greeks to spare the house. According to some authorities, he afterward founded a new kingdom at Troy on the ruins of the old one; according to others, he settled at Cyrene or on the W. shore of the Adriatic.

ANTEQUERA (anc. *Antiquaria* or *Anticaria*), a city of Spain, in the province and 25 m. N. by W. of Malaga, with which it is connected by railroad, on the Guadalorce; pop. 25,900. It is situated in a fruitful valley, surrounded by lofty mountains containing numerous marble quarries, and has many churches and convents, and some remains of antiquity. While the Moors held the kingdom of Granada this city was a fortress of great importance, and the possession of it was constantly contested. A Moorish castle, built on Roman foundations, still exists in the upper part of the city. The inhabitants are chiefly employed in agriculture and the manufacture of cloth, leather, paper, silk, and cotton.

ANTHELMINTICS. See Entozoa.

ANTHEMIUS. **I.** Emperor of the West from A. D. 467 to 472. He was the son-in-law of the emperor Marcian, and was invested with the purple at the suggestion of Ricimer, who ultimately became his son-in-law. Anthemius and Ricimer soon quarrelled, however, and then the latter, proclaiming Olybrius emperor, laid siege to Rome. The city was taken by storm, and Anthemius was slain. **II.** An architect and mathematician of Tralles in Lydia, who flourished in the 6th century. He designed for the emperor Justinian the plan and commenced the building of the church of St. Sophia. A fragment of one of his mathematical works was published at Paris in 1777.

ANTHER (Gr. ἀνθηρός, flowery), the male organ of the flower. Considered morphologically, it is a modified leaf, the petiole or stem of the leaf becoming the filament of the stamen, and the leaf blade by the separation of its two surfaces forming two thecæ or lodges containing pollen, the midrib of the leaf becoming the connective of the anther. The filament may be absent, when the anther is said to be sessile; and it may be inserted on the style, as in orchids (in the Linnæan class *gynandria*), or on the corolla. Several filaments may be more or less united, sometimes forming a tube around the style, as in *malvaceæ* (class *monadelphia*); sometimes a split tube with a single detached filament, as in *leguminosæ* (class *diadelphia*); sometimes the tube is split into several portions, forming clusters of stamens (class *polyadelphia*). The filaments may differ in length in the same flower, as two short and two long (class *didynamia*), or two long and four short (class *tetradynamia*). The number of stamens characterizes 13 classes of the Linnæan system, which is now wholly abandoned by botanists. The attachment of the anther to the filament varies. Sometimes the connective is only a prolongation of the filament (adnate anther), which may extend far beyond the anther, as in the oleander. If the filament joins the connective at its centre, it may balance the anther if the connective is linear, in which case the anther is said to be versatile; or if the connective is shield-like, bearing several pollen lodges on its lower edge, it is called peltate. Lilies present an example of the first, and in tulips the connective has a funnel-like hollow in which the filament is fixed; and the juniper, cypress, &c., show the peltate form. The anther appears in the flower bud before its filament as a gland-like excrescence. The two cells on either side the connective often subdivide into four; but as the development progresses the septum disappears and the anther becomes bilocular, or even, by the removal of the connective, unilocular. The lodges are cylindrical, globose, ellipsoid, cordate, kidney-shaped or hastate, or even, as in the squash, undulating or twisted. The surface may be smooth, or downy, fringed, and bearded, as in lobelias. Anthers may be united in the same way as the filaments, as in *compositæ* (class *syngenesia*), or they may be suppressed or abortive on some of the filaments. From their position on the connective, they are said to be introrse when the lodges face the style, or extrorse when they are directed outward, which is the more common position. When the pollen is ripe the anther opens, either by pores at the base or apex (and these pores are sometimes at the end two tubular extensions of the lodges), as in the potato and melastoma; or by valves, as in the barberry; or, what is most common, by clefts or sutures on the edge corresponding to the edge of the typical leaf. After the discharge of the pollen the anther collapses, and, if of a yellow or orange color when full, becomes a dark orange-brown.

ANTHON, Charles, LL. D., an American classical scholar, born in New York in 1797, died there, July 29, 1867. His father, Dr. G. C. Anthon, a German by birth, was surgeon general in the British army, and soon after the revolution settled in New York. Charles graduated at Columbia college in 1815, and in 1819 was admitted to the bar. The next year he was appointed adjunct professor of languages in Columbia college. In 1830 he produced his large edition of Horace. In that year, also, he became rector of the grammar school attached to the college, and in 1835 he succeeded Prof. Moore as head of the classical department of that institution. For many years it was his constant custom to retire at 10 and rise at 4, so that a large part of his day's work was done by breakfast time; and thus he produced some 50 volumes, consisting chiefly of editions of the Latin classics and aids to classical study, and including a Latin lexicon and a "Dictionary of Greek and Roman Antiquities." All his works were republished in England. When first made rector of the grammar school, he conferred on the public schools of his native city six free scholarships.

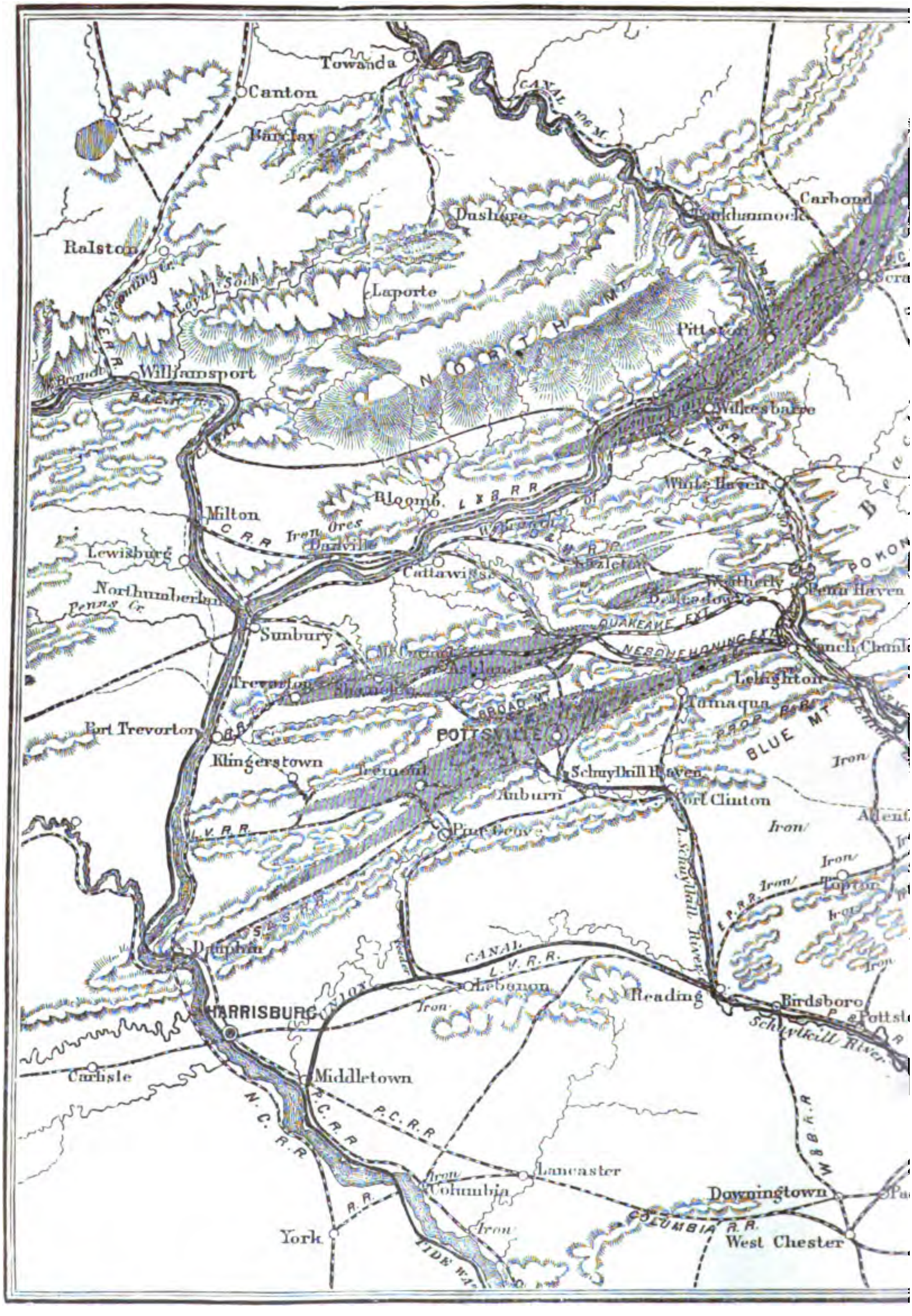
ANTHONY, Henry B., an American journalist and senator, born at Coventry, R. I., April 1, 1815. He was educated at Brown university, became in 1838 editor of the "Providence Journal," was governor of Rhode Island in 1849 and 1850, and declined a reëlection in 1851. In 1859 he was elected United States senator as a republican, succeeding Philip Allen, a democrat; was reëlected in 1864, and again in 1870. He was a delegate to the Philadelphia convention of 1866, and president *pro tempore* of the senate for some time in 1869 and 1871.

ANTHONY, Saint. I. Surnamed the Great, born in Upper Egypt in 251, died in 356. He was rich and well educated, but sold all his possessions, gave the money to the poor, and retired into the desert, where he spent a great many years in ascetic solitude. At the age of 54 he was persuaded to become the director of a number of anchorets who wished to enjoy his instructions. They dwelt in detached cells in Fayoom, near Memphis, and from this establishment dates the foundation of the monastic system. St. Anthony twice left his retreat and visited Alexandria: once during the persecution by Maximian in 311, when he hoped to obtain the crown of martyrdom; and again in 355, to support his friend Athanasius against the Arians. During his seclusion he is said to have neglected ablutions, clothed himself simply in a hair shirt, and fought with devils. He was reported to have cured a cutaneous disease known before his time as the "sacred fire," but afterward as St. Anthony's fire, and later as erysipelas. On this tradition an order bearing his name was founded (1095) for the care of patients with this disease by Gaston, a rich French nobleman, at St. Didier-la-Mothe, in gratitude for a supposed cure wrought on his son by the reputed bones of the saint. II. Of Padua, born in Lisbon, Aug. 15, 1195, died in Padua, June 13, 1231. He was one of the leaders of the newly established order of Franciscan monks, and, desirous of martyrdom, embarked for Africa, was shipwrecked on the coast of Italy, and preached with wonderful eloquence and success in the cities of Montpellier, Toulouse, Bologna, and Padua. He was canonized by Pope Gregory IX. in 1232, and is honored especially in Portugal and Italy.

ANTHONY, Susan Brownell, an American reformer, born in South Adams, Mass., Feb. 15, 1820. Her father was a member of the society of Friends. She was employed in his cotton factory, completed her education in a school at Philadelphia, and from 1837 to 1852 was a teacher in the state of New York. She became interested in the cause of temperance, and an admission to a convention being denied to her on account of her sex, she called a convention of women (1849), and since that time has been conspicuous in various philanthropic and reformatory movements. She has identified herself especially with the agitation for female suffrage, in the interest of which she has visited many parts of the United States, and delivered numerous lectures and addresses. In 1868 she founded in New York a journal called "The Revolution," which she conducted for some time in conjunction with Mrs. Elizabeth Cady Stanton and Parker Pillsbury. She has acted on several occasions as delegate of the New York working women's association.

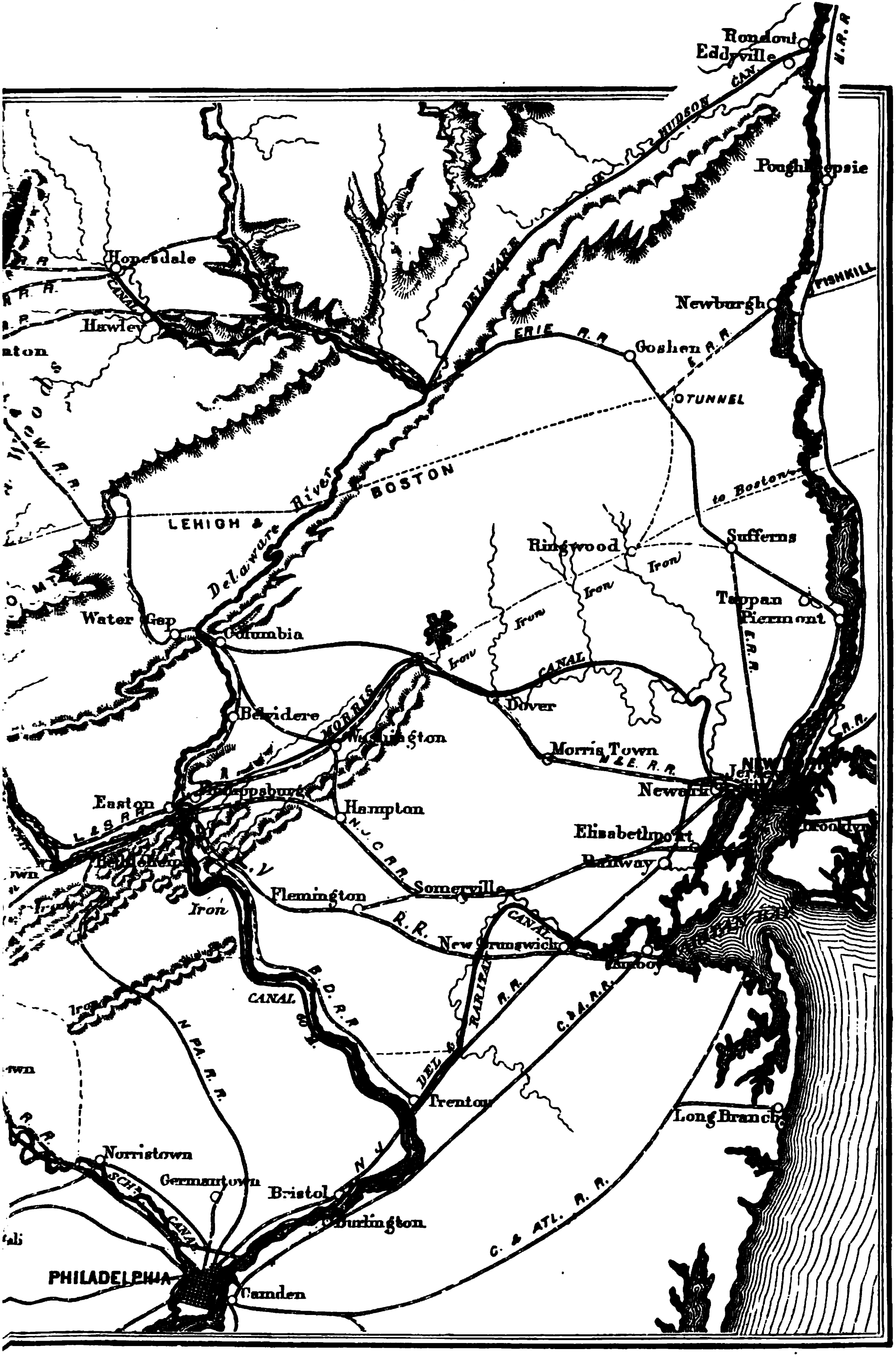
ANTHRACENE ($C_{14}H_{10}$), formerly called paranaphthaline, a solid hydrocarbon which accompanies naphthaline in the last stages of the distillation of coal tar, and which has acquired great importance as the material from which artificial alizarine is now manufactured. In an experiment made on a large scale it was found that 100 tons of tar yielded 0·63 ton of anthracene, or one ton of anthracene can be obtained from the distillation of about 2,000 tons of coal, not reckoning the quantity of anthracene contained in the pitch. The preparation of anthracene is conducted as follows: The semi-fluid product of the fractional distillation of coal tar, commonly called green grease, is placed in a centrifugal machine in order to expel mechanically as much as possible of the oil, and the residue is pressed between hot plates. The crude material is carefully distilled, rejecting the portion which comes over between 340° and 350° C., and the portion remaining in the retort is exhausted with rectified petroleum at a boiling heat, filtered, and cooled. The crystalline mass is expressed and the entire operation repeated several times. On recrystallization from alcohol, the nearly pure anthracene is obtained in rhomboidal plates. If these be carefully sublimed, a chemically pure product is obtained. Pure anthracene occurs in bluish-white foliated crystals, having a beautiful violet fluorescence. These crystals are rhomboidal tables. A little above 200° C. it melts to a limpid liquid, which becomes rapidly dark-colored. It is not perceptibly volatile at 100° C., but between 210° and 220° C. it sublimes easily, yielding a fetid and irritating vapor. Distilled at 350° C., it is partially altered. It is quite soluble in boiling alcohol, and in light naphthas, from which it crystallizes out on cooling. Heated slightly with fuming sulphuric acid, it dissolves gradually, giving a greenish solution of the sulphanthracene acid. The green color appears to be due to a trace of nitrous compounds of the acid. Nitric acid attacks anthracene violently, and chlorine and bromine act upon it, yielding substitution products. Anthracene has been made artificially from toluole and from benzole.—The chief use of anthracene is in the artificial production of alizarine. Several patents have been taken out for this purpose by Gräbe and Liebermann, who were the original discoverers in 1869 of the methods of its manufacture. (See ALIZARINE.)

ANTHRACITE (Gr. ἀνθρακίτης, like coals, from ἄνθραξ, coal), the most condensed variety of



MAP OF THE ANTHRACITE REGION OF PENNSYLVANIA,

BY S. HARRIES DADDOW



EXHIBITING ITS RELATIONS TO THE PRINCIPAL MARKETS.

, ENGINEER OF MINES, &c.

UNIV.

mineral coal, containing the largest proportion of carbon and the smallest quantity of volatile matter. Excepting the diamond, anthracite is the purest form of carbon in its natural state. The best specimens contain 95 per cent. carbon, but the average production of the purest beds of this coal will not exceed 90 per cent., and generally not more than 80 to 87 per cent. carbon. The volatile matter in the dense, hard varieties is almost exclusively water and earthy impurities, but in common varieties the volatile portion consists of water, hydrogen, oxygen, and nitrogen; while the ash or incombustible matter contains oxide of iron, iron pyrites, silica, alumina, magnesia, lime, &c. The gradation of anthracite is arbitrary; there is no fixed limit in the descending scale at which anthracite becomes semi-anthracite. A coal containing 80 per cent. carbon may be and often is termed anthracite, while other coals containing 85 per cent. carbon are truly semi-bituminous. The superior density, irregular fracture, and general appearance of anthracite are distinguishing features to common observation; while water and ash take the place of hydrogen and oxygen, or bituminous matter. But anthracite which contains only 80 per cent. carbon, with 20 per cent. water and incombustible matter, is the lowest grade of commercial coal, and of little value as fuel.—The constituents of anthracite, as determined by ordinary analyses, and generally published, are only approximate. They are generally made from picked specimens, by many men and many methods, each giving widely diverse results even from the same coal, and the mere aggregates of carbon, volatile matter, and ash, while the distinguishing features and chemical constituents are seldom given. The change from anthracite to semi-anthracite is gradual and imperceptible in the coal beds of the prominent anthracite fields. There is no fixed point at which the one terminates or the other commences. The same uncertainty is manifest in all published analyses of mineral coal. No commonly adopted limit is assigned to the various gradations. Those called semi-anthracite in one place are termed anthracite in others, and *vice versa*. The same indefinite relations are observable between semi-anthracite and semi-bituminous, and between semi-bituminous and bituminous coals; while the gradations of all carbon compounds are alike indefinite and unsettled, down through cannel coal, bitumen, asphaltum, petroleum, naphtha, and carburetted hydrogen gases. The uncertainty, however, exists in the mean and not the extreme varieties. Hard, dense anthracite could not be mistaken for any other class; and while light, volatile semi-anthracite might be readily termed semi-bituminous, it could not be mistaken for anthracite. The following table gives the average aggregate constituents of the prominent varieties from the chief anthracite districts of the world:

ANALYSES OF ANTHRACITE.

LOCALITY.	By whom analysed.	Nomenclature.	Carbon.	Volatile matter.	Ashes.	Density.	Color of ashes.
No. 0. Lackawanna, Carbondale	Rogers' Reports	E	90·23	7·07	2·70	1·400	White.
" 1. Lehigh District, Mauch Chunk	Olmsted	E	90·10	6·60	3·30	1·550	"
" 2. " " "	Dr. J. Percy	E	92·60	5·15	2·25	1·553	"
" 3. " " Beaver Meadow	Johnson	E	92·30	6·42	1·28	1·630	"
" 4. Pottsville District, Tamaqua	Rogers' Reports	E	92·07	5·03	2·90	1·570	"
" 5. " Delaware mines, mean of 40 varieties	Johnson	M	86·09	6·96	6·05	1·460	Red.
" 6. " Mammoth coal bed	Rogers' Reports	E	94·10	1·40	4·50	1·500	White.
" 7. West'n Dist., Lykens Valley, semi-anthracite	M. C. Lea	B	85·70	10·00	4·30	1·416	Red.
" 8. " " Dauphin, semi-bituminous	Johnson	?	76·10	16·90	7.00	1·350	?
" 9. Virginia, Price's Mountain	A. H. Everett	B ?	89·25	2·44	8·30	1·370	Pink.
				water.			
" 10. Rhode Island, Portsmouth	Dr. C. T. Jackson	?	85·84	10·50	3·66	1·350	?
" 11. Massachusetts, Mansfield	"	?	87·40	6·20	6·40	1·690	?
" 12. South Wales, hard anthracite	De Schaufhauelt	?	92·42	5·97	? 1·60	?	?
" 13. " " semi-anthracite	Taylor	?	86·24	12·00	1·76	?	?
" 14. French, Mayence	Dr. A. Fyfe	?	90·72	8·34	? ·94	?	?
" 15. Jurassic, Lamure	M. V. Regnault	?	88·54	6·89	4·57	1·370	?
" 16. Russia, Donetz	M. Voskressensky	?	94·234	?	?	?	?
" Tiflis	"	?	68·694	?	?	?	?
New Mexico, Santa Fé, lignitic anthracite	Henry M. Smith	?	74·372	19·576	6·052	?	Pink.
Sonora, Les Broucos, " "	"	?	84·103	8·693	7·204	?	Gray.

The above table is compiled from the best available sources; and though the analyses are generally from hand specimens, and therefore not commercially useful, they are characteristic, and indicate the chief constituents of the prominent anthracites.—The anthracites of Pennsylvania are generally denominated white-ash or red-ash coals, but the color of the incombustible residue varies from pure white to gray, rose-pink, pink, light-red, brick-red, and brown; and this variation of color is as marked in the ash of bituminous and all intermediate varieties of coal as in anthracite. The color of the ash is obtained from the oxide of iron, and is no criterion of the character or value of the coal, because these colors exist, from white to brown, in the lowest, oldest, and hardest anthracite, as well as in the upper, latest, softest, and most volatile semi-anthracite and bituminous coals.—The nomenclature proposed by Prof. J. P. Lesley and adopted in "Coal, Iron, and Oil," the latest standard work on anthracite, in which the beds are identified in the Pennsylvania anthracite fields and connected with the bituminous coal beds of the Alleghany field, designates the lowest workable and consistent bed as A and the highest as N. But this nomenclature denotes series or groups of coal beds, rather than single beds. Fig. 1 presents the general type of the Pennsylvania anthracite strata. The figures in the column and in connection with the letters indicate thickness in feet. A number of small unworkable seams are not here represented. The 15 groups from A to N include 30 beds above 2 ft. thick and 20 seams less than 2 ft. This mode of grouping the beds in the anthracite fields was suggested by the natural divisions of massive sandstone and conglomerate strata in the coal measures, and the frequency with which some of the prominent groups united as a single bed or divided into two or three beds. In the southern anthracite field of Pennsylvania a few imperfect, irregular, and impure "nests" or pockets, rather than beds, of graphitic anthracite are occasionally found below A; but these local deposits have no general horizon, and are valueless for commercial purposes. Though pockets of good coal are sometimes found from 5 to 20 ft. thick, they vary to as many inches, and do not exist as regular and consistent beds. A is usually a small bed of red-ash coal, but two or three thin seams are frequently found in this group which exist in the conglomerate, or close to it, everywhere. The coals of A generally contain from 10 to 20 per cent. of earthy matter, and are seldom workable. B is generally a large bed from 10 to 30 ft. thick, but frequently two beds of 5 to 10 ft. each. The lower part produces red-ash coal, and the upper gray or pink. The coal is excellent, and valued for blast furnances, though it contains more silica than the coal of any other workable bed higher in the measures. C is usually a group of small unworkable beds, producing white or gray-ash coals. D is a single bed of pure white-ash coal, generally from 5 to 10 ft. thick. E is the celebrated mammoth, which is a single bed from 20 to 70 ft. thick in some localities, and a group of two and three in others. The coal is always of the white-ash variety, and is hard, dense, pure, and lustrous. Fully eight tenths of the present anthracite production is from this group. F is composed of two small beds of white-ash coal, and is not of much value; it is often known as the "rough vein." G is generally a large bed from 7 to 10 ft. thick, and always a single one, though the lower stratum produces white-ash and the upper pink or gray-ash. It is locally known as the gray-ash or primrose vein, and is supposed to be identical with the Pittsburgh bed in the bituminous field. All the workable beds, from A to G inclusive, produce blast furnace coal; but the coals of the beds from G to N are less dense and contain less carbon and more volatile matter than the lower coals, and crumble under a high temperature. They are therefore not used for steam and furnace purposes generally, but are much valued for household uses, excepting large furnace heaters. They evolve an intense heat, and are free-burning, but will often "clinker" under a strong draught. In the preceding analytical table the highest percentage of carbon is 94·10 (No. 6), which is a hand specimen from the mammoth bed, E, in the Pottsville district; but it is a well known fact that the mammoth coals of the Lehigh district are equally as pure and generally more dense than any other anthracite. The average, therefore, of Nos. 1, 2, 3, 4, and 6 will give the mean of the hardest and purest anthracite; while No. 5 (M) is a type of the upper coals, and approaches the limit of the true anthracite, as shown by 7 and 8, which are semi-anthracite and semi-bituminous. The density and hardness of the coal decrease from A to N in the ascending order, while the volatile matter increases from N to A in the descending order; and the proportions of carbon increase and decrease in the same ratio and order. The coals of the lower beds are most hard and dense. The middle beds produce the purest coal, and the coal of the upper beds is most soft and friable under heat. The

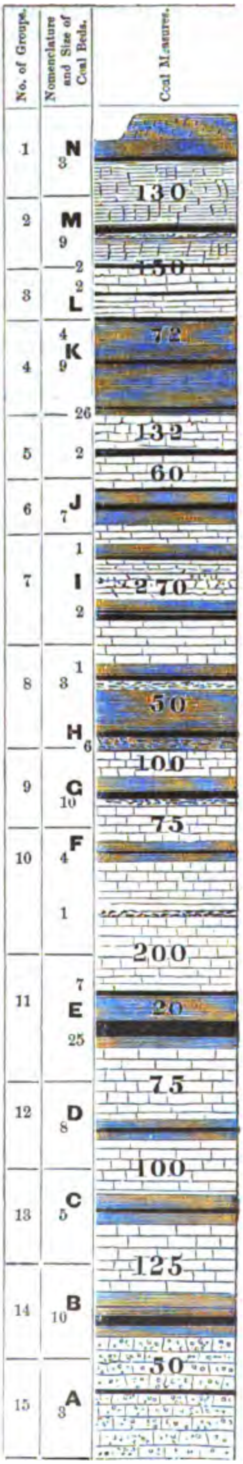


Fig. 1.—Anthracite Strata

same description would apply to the general decrease of carbon and increase of volatile matter in these coal beds from east to west. There is a gradual decrease also in the dimensions of the beds in the same direction. The same gradual change from hard anthracite to semi-anthracite and bituminous is as marked a feature in the South Wales (English) coal fields as in the Pennsylvania coal fields. The general features and fractures of hard anthracite are peculiar and noticeable to the common observer. They are massive, hard, dense, amorphous or conchoidal in fracture, with fine, sharp edges when broken, and a rich satin or an iron-black sub-metallic lustre. With some local exceptions, the softer varieties, both red and white-ash, are less massive, hard, and dense, more regular and cubical in fracture, and, exclusive of the upper red-ash beds, less rich and lustrous.—The prominent anthracite fields of the world are those of Pennsylvania and South Wales, which produce nine tenths of the quantity used. The developed coal fields of the world embrace an area of about 350,000 sq. m., of which over 300,000 are in the United States, exclusive of lignite. (See Coal.) About 2,000 sq. m. of this entire area contain anthracite, of which half is in the United States, including the somewhat doubtful New England coal fields. The entire coal production of the world in 1871 was between 225 and 250 million tons, of which England produced 110 millions and the United States 41 millions. About 20 millions of the entire amount was anthracite, of which 15 million tons were produced in Pennsylvania, and the remainder in South Wales, France, and other countries.—The South Wales coal field lies on the northwest of the Bristol channel, extending from St. Bride's bay in the east to Pontypool in the west, a distance of 90 m., with a maximum breadth of 60 m. Its mean breadth is less than 20 m., presenting an area of about 1,500 sq. m., of which only 1,000 contain workable coal beds. It is divided by an axis parallel to its strike, and divided also into numerous intermediate basins, while the measures undulate both from E. to W. and from N. to S. The deepest part of the field is supposed to be 8,000 ft. Most of the mining has been done by "drifts," and but few shafts had been sunk to any great depth up to 1864. Twenty-three workable seams exist in the principal basins, averaging altogether 92 ft. of coal. Of these, 12 are from 3 to 9 ft. thick, and 11 from 18 in. to 3 ft. Besides these there are numerous smaller seams from 6 to 18 in. thick. On the N. side of the field the coal is anthracite in character, and resembles the anthracites of Pennsylvania, though generally containing more hydrogen or volatile matter; on the E. or N. E. the coal is semi-bituminous, and is used extensively, both raw and coked, in the blast furnaces of the region. On the S. side the coal is of a bituminous character. The change from anthracite to semi-bituminous and bituminous is gradual, and much the same in its metamorphic phases as we find existing in the coal fields of Pennsylvania. There are 16 thin seams of ironstone interstratified with the coal; the general yield of this ore is not over 30 per cent. of metal in the furnace. The coal production of South Wales in 1854 was 8,550,270 tons; of this amount only 1,000,000 tons was anthracite, the total being the products of 245 collieries. —The anthracites of Pennsylvania exist in four parallel coal fields, in the counties of Schuylkill, Carbon, Columbia, Northumberland, and Luzerne, embracing an area of 470 sq. m. Within these fields numerous parallel basins or synclinal troughs are formed by the peculiar undulations of the strata, which dip at every angle from horizontal to perpendicular. Fig. 2 represents the general grouping of the principal basins of the southern Pennsylvania anthracite field, and the eastern part of the middle field, without reference to local peculiarities and abrupt dips.

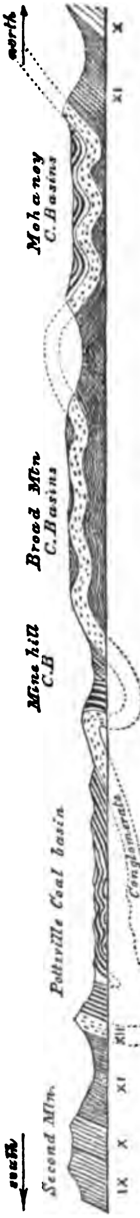


FIG. 2.—Group of Pennsylvania Anthracite Basins.

PENNSYLVANIA ANTHRACITE FIELDS.

Wyoming or Northern Coal Field	198 sq. m.	
Lackawanna Region		100 sq. m.
Wyoming Region		98 "
Middle or Second Coal Field	91 "	
Shamokin Region		50 "
Mahanoy Region		41 "
Lehigh Coal Field	87 "	
Hazleton Basin		10 "
Beaver Meadow		8 "
Big and Little Black Creek		9 "
Lower Black Creek		5 "
Green Mountain and other small basins		5 "
Southern or Schuylkill Coal Field	146 "	
Lehigh Region (E. extremity)		16 "
Pottsville Lykens Valley Region		99 "
Middle Region (semi-anthracite)		16 "
Dauphin Region (semi-bituminous)		15 "
Total		470 "

Coal was discovered in the Wyoming valley soon after its settlement, but the first authentic account which we find of the use of anthracite in the United States was in 1768–'9, when it was used by two blacksmiths from Connecticut named Gore. One of these brothers, Jude Obadiah Gore, related the facts to Judge Jesse Fell of Wilkesbarre, who subsequently communicated them to Silliman's "Journal" and Hazard's "Register." In 1776 coal was quarried from the Baltimore bed near Wilkesbarre and the Smith mine near Plymouth, and taken down the Susquehanna in arks to the government arsenal at Carlisle. This trade was continued during the revolutionary war, and anthracite was used by the blacksmiths and gunsmiths of the lower Susquehanna from that time forth; but from the difficulty of making it burn it was not used for domestic purposes till 1808, when Judge Fell succeeded in burning "stone coal" in a grate of his own construction. Anthracite was sold in the vicinity of Wilkesbarre to the smiths at $3 a ton, and in Marietta, on the lower Susquehanna, at $8 to $9 a ton from 1810 to 1814. This was probably the first successful use of anthracite for general purposes in the world. The earliest record of the production of anthracite in France, as given by Taylor, is in 1814; while Mr. Blakewell, an English geologist, says the Welsh coals were "inferior" and not used for domestic purposes in 1813, and but "little used" in 1828.—The northern or Wyoming coal field is naturally divided into two regions, the Lackawanna and the Wyoming, and these into several districts. The Lackawanna region includes the districts on the Lackawanna creek, which empties into the Susquehanna at Pittston. The districts are the old or original Lackawanna, at and around Carbondale, the Scranton, and the Pittston. Around these centres the early developments of the Lackawanna region were made, and collieries clustered. The Carbondale district was opened in 1829 by the Delaware and Hudson company's canal and railroad; the Scranton district by the Delaware, Lackawanna, and Western railroad, in 1854; and the Pittston district by the Susquehanna canal in 1843, and the Pennsylvania coal company's railroad in 1850. The production of the Wyoming or northern coal field in 1871 was 6,481,171 tons. Of this amount 2,867,598 tons was sent from the Wyoming region, and 3,613,573 from the Lackawanna. There are now (1873) nine railroads and two canals employed in transporting coal from these regions. The coal beds in the Wyoming portion extend to K (fig. 1), but in the Lackawanna the number is less, extending only to H or I. The coal of the entire field is anthracite.—The first or southern and middle anthracite fields are the next in size and importance, and in order of development. Their topography and geology differ materially from the northern field, as shown by fig. 2 from Lesley. The valleys in which the coal exists are comparatively narrow, while both anticlinals and synclinals and the strata of the measures are more abrupt than those of the former. This field terminates in the east on the Lehigh river, in a single point or synclinal trough. In the west are two terminal points or prongs, which are wide apart at their extremities near the Susquehanna. Its extreme length is 73 m. to the end of the Dauphin or south fork, and 10 m. less by the Lykens Valley or north fork. Its mean breadth is 2 m., and its maximum, at Pottsville, 5 m. The number of coal beds is greater in this than in any of the other anthracite fields. The coal of the E. end is hard anthracite; of the Lykens Valley fork, semi-anthracite; and of Dauphin fork, semi-bituminous. The middle anthracite field is divided longitudinally by the Locust mountain anticlinal, over which the coal beds connect at several points. It is divided into two regions. The Mahanoy region is 25 m. long, with a mean breadth of nearly 2 m. Its basins are narrow and deep, and the strata abrupt. The Shamokin or northern part, not shown in fig. 2, is 20 m. long, with a mean breadth of 2½ m. The basins are wider, of less depth, and the strata of less inclination, than the former. The highest bed in this field is K. The coal is generally anthracite, except at the W. extremity, where it is semi-anthracite. The earliest records we find of the existence of coal in the southern and middle coal fields are those on Scul's map of Pennsylvania and Faden's "Atlas of North America" (1810–'17). The first discovery for practical purposes, however, was made in 1791 by a hunter named Philip Ginter on the Lehigh end of the southern coal field, and on the site of the since famous Lehigh coal quarry at Summit Hill. In the following year the "Lehigh Coal Mine Company" was formed by Robert Morris, J. Anthony Morris, Cist, Weist, Hillegas, and others, who secured 6,000 acres of land and opened the quarry the same year (1792) to test the character and value of the coal. In 1798 a charter was obtained by this company for a sluice navigation on the Lehigh, and in 1803 six arks with 600 tons of coal, from the Summit Hill quarry, were started down the river; but only two, with less than 100 tons each, reached Philadelphia. The city authorities purchased the coal to supply a steam engine used at the water works, then in Broad street; but it could not be made to burn, probably because it was tried in large lumps, and was broken up to gravel the walks of the grounds. In 1806 another ark load was taken to Philadelphia with no better success. It appears, however, from a brief account of "The Discovery of Anthracite on the Lehigh," in the memoirs of the historical society of Pennsylvania, written by Dr. T. C. James of Philadelphia, who had visited the mines, that he had commenced using stone coal in the winter of 1804, and, having laid in a supply from this and the former cargoes, continued to use it to the day of publication in 1826. About this time (1800) William Morris, whose mines were near Port Carbon, Schuylkill county, took a load of coal to Philadelphia, but did not succeed in selling or bringing his new "stone fuel" into notice. In 1814 two arks of coal reached Philadelphia, of five which were started from the mines, and these two cargoes were sold to Messrs. White and Hazard at the Schuylkill Falls wire manufactory, at $21 per ton. But previously, in 1812, Col. George Shoemaker of Pottsville had taken nine wagon loads of coal from his mines at Centreville, near Pottsville, to Philadelphia, and had disposed of two loads at the cost of transportation to these gentlemen, who desired to succeed in using it at their manufactory. Mr. White and his firemen spent half a day in the attempt to burn it without success. At noon they closed the furnace doors and went to their dinner in disgust with "stone coal;" but on their return they were astonished to find the doors red-hot and the furnace in danger of melting. Since then anthracite has been a desirable and eminently available fuel for all purposes. Col. Shoemaker, however, had disposed of the other seven loads to others who did not succeed in making the coal burn, though this was the free-burning red-ash variety, and they obtained a writ from the city authorities for his arrest as an impostor and swindler, who had sold them rocks for coal. The Lehigh navigation was improved in 1820, and during that year 365 tons of anthracite—which heads the column of the trade—was sent to Philadelphia and sold at $8 50 a ton. From this time the anthracite trade has steadily increased. Previous to 1847 most of the Lehigh coal was obtained from the open quarry in the mammoth or E bed (not an accumulation of beds, as is generally supposed), on the spot where the coal was first discovered. In 1847 about 2,000,000 tons had been sent from this quarry, and 30 to 40 acres had been excavated from the bed, which is here 50 ft. thick. Since this date the quarry method has been abandoned for regular mining operations by tunnels and slopes. The original "Coal Mine Company" leased in 1817 their whole property and privileges to Messrs. White, Hazard, and company, for 20 years, at an annual rental of one ear of corn! but they were bound to deliver for their own benefit 40,000 bushels of coal annually in Philadelphia. These gentlemen formed their interests into a stock company—the "Lehigh Coal Company"—and also organized the Lehigh navigation company, afterward incorporated as the Lehigh navigation and coal company, and subsequently changed to the Lehigh coal and navigation company. The stock of the old coal mine company was bought up by the new organization. At first the shares, representing 50th parts of the whole property, were bought at $150 each; the last brought $2,000. The number of tons shipped by the Lehigh canal in 1871 was 740,630, and the total amount by canal from the commencement of the trade is 26,139,540 tons, of which, however, a considerable portion was mined in other regions. The Schuylkill canal was projected in 1814, and so far completed in 1822 that 1,480 tons were shipped over it to Philadelphia. Since then 28,700,015 tons have passed through it, of which 1,010,171 tons were shipped in 1871. The first railway built in the United States, except one of three miles at Quincy, Mass., was a gravity road from the Lehigh quarry at Summit Hill to the canal at Mauch Chunk, a distance of 9½ m. This was used from 1827 to 1872 for the transportation of anthracite; but on the completion of the Nesquehoning tunnel through the Locust mountain the old gravity line was abandoned as a coal road, and is now devoted to pleasure excursions, for which it has long been famous on account of the novelty of the ride and the picturesque grandeur—sometimes beauty—of the rapidly changing scenes. The view from the top of Mt. Pisgah, which towers over the waters of the Lehigh, is remarkably wild and grand. The numerous railroads built as feeders to the Lehigh and Schuylkill canals and the principal trunk lines will be found in an accompanying table. The Philadelphia and Reading railroad, opened from Pottsville to Philadelphia in 1841, had transported 62,128,735 tons of anthracite up to 1872, of which 4,584,450 tons were shipped during 1871. The Lehigh Valley railroad was opened from Mauch Chunk to Easton in 1853, and transported 2,889,074 tons in 1871, and a total of 22,981,252 since its completion. This line has since been extended through the Wyoming valley and into the state of New York, on the line of the Susquehanna river. The Lehigh and Susquehanna railroad, opened from the head of navigation on the Lehigh into the Wyoming region in 1846, was extended to Easton as a great trunk line in 1867, and during the next year 1,058,054 tons were transported over it. The term "Lehigh coal region" originally designated only that portion of the southern anthracite field which extended from Tamaqua on the Little Schuylkill to the Lehigh river; but since the completion of the Beaver Meadow and Hazleton feeders to the main line of canal the name has been applied to all the small middle basins, of which there are six, though three of these—the Little, Big, and Lower Black Creek basins—are on a tributary of the Susquehanna, and cannot properly be termed Lehigh basins. They produce a hard, dense, amorphous coal, resembling the original Lehigh coal in both feature and character. The geology of these small basins is similar to that of the E. end of the southern and middle anthracite fields. They are long, narrow, canoe-like troughs, nearly parallel in strike with themselves, and with the larger fields to the south, north, and east. The upper productive coal bed in these small basins is E. No. 3 in the preceding analytical table represents the general type of these basins. The small percentage of ash, however, is an exception.—The number of collieries in these anthracite regions in 1871 was 437, and their entire production, including home consumption (not in the tables), was 17,000,000 tons; and 52,227 men and boys were employed in and about the mines.

TABLE OF ANTHRACITE PRODUCTION IN PENNSYLVANIA.

(From Bannan and Ramsey's "Coal Trade Statistical Register.")

YEARS.	Schuylkill.	Wyoming and Lackawanna.	Lehigh.	Lykens Valley.	Shamokin.	Trevorton.	Aggregate.
1820	......	....	365	....	....	....	365
1821	......	....	1,073	....	....	....	1,073
1822	1,480	....	2,240	....	....	....	3,720
1823	1,128	....	5,823	....	....	....	6,951
1824	1,567	....	9,541	....	....	....	11,108
1825	6,500	....	28,393	....	....	....	34,893
1826	16,767	....	31,280	....	....	....	48,047
1827	31,360	....	32,074	....	....	....	63,434
1828	47,284	....	30,232	....	... .	....	77,516
1829	79,973	7,000	25,110	....	....	....	112,083
	186,059	7,000	166,131				359,190
1830	89,984	43,000	41,750	....	....	....	174,734
1831	81,854	54,000	40,966	....	....	....	176,820
1832	209,271	84,600	70,000	....	....	....	363,871
1833	252,971	111,777	123,000	....	....	....	487,748
1834	226,692	43,700	106,244	....	....	....	376,636
1835	339,508	90,000	131,250	....	....	....	560,758
1836	432,045	103,861	148,211	....	....	....	684,117
1837	523,152	115,387	223,902	....	....	....	862,441
1838	433,875	78,207	213,615	....	....	....	725,697
1839	442,608	122,300	221,025	....	11,930	....	797,863
	3,218,019	846,832	1,319,963		11,930		5,210,685
1840	452,291	148,470	225,318	....	15,505	....	841,584
1841	585,542	192,270	143,037	....	21,463	....	932,312
1842	541,504	252,599	272,546	....	10,000	....	1,076,649
1843	677,312	285,605	267,793	....	10,000	....	1,240,710
1844	840,378	365,911	377,002	....	13,087	....	1,596,458
1845	1,083,796	451,836	429,453	....	10,000	....	1,975,085
1846	1,236,582	518,389	517,116	....	12,572	....	2,284,659
1847	1,583,374	583,067	633,507	....	14,904	....	2,814,852
1848	1,652,835	685,196	670,321	....	19,356	....	3,027,708
1849	1,605,126	732,910	781,656	25,325	19,650	....	3,164,661
	10,258,740	4,216,253	4,317,749	25,325	146,987		18,954,678
1850	1,712,007	827,823	690,456	37,763	19,921	....	3,287,970
1851	2,229,426	1,156,167	964,224	54,200	24,899	....	4,428,916
1852	2,450,950	1,284,500	1,072,136	59,857	25,846	....	4,893,289
1853	2,470,943	1,475,732	1,054,309	69,007	15,500	....	5,086,391
1854	2,895,208	1,603,478	1,207,186	107,500	63,500	....	5,876,872
1855	3,318,555	1,771,511	1,284,113	117,221	116,117	....	6,607,517
1856	3,258,856	1,972,581	1,351,970	102,926	210,518	73,112	6,896,851
1857	2,985,541	1,952,603	1,318,541	121,789	266,517	110,711	6,644,941
1858	2,866,449	2,186,094	1,380,030	127,815	242,579	106,686	6,802,967
1859	3,004,953	2,731,236	1,628,311	138,712	305,043	124,290	7,808,255
	27,192,888	16,961,725	11,951,276	936,770	1,291,040	414,799	58,333,469
1860	3,270,516	2,941,817	1,821,674	178,860	300,256	90,148	8,513,123
1861	2,697,489	3,055,140	1,738,377	172,380	290,928	49,477	7,954,314
1862	2,890,598	3,145,770	1,351,054	177,121	304,865	68,228	7,869,408
1863	3,433,265	3,759,610	1,894,713	141,282	337,186	62,200	9,566,006
1864	3,642,218	3,960,836	2,054,669	129,973	389,779	56,801	10,177,475
1865	3,735,802	3,255,658	1,822,535	136,900	484,257	27,095	9,435,152
1866	4,633,487	4,736,616	2,128,867	219,918	610,809	58,648	12,329,692
1867	4,334,820	5,325,322	2,062,446	298,086	533,815	48,118	12,552,489
1868	4,414,356	5,990,813	2,507,582	380,888	911,787	38,728	13,334,182
1869	4,748,969	6,068,369	1,929,523	384,749	974,015	45,612	13,651,747
	37,801,521	42,243,951	19,311,440	3,151,352	4,897,891	534,550	106,833,488
1870	3,720,408	7,554,909	2,990,878	453,818	1,025,515	67,847	15,274,029
1871	5,124,780	6,481,171	2,249,856	481,328	1.213,096		14,965,501
Totals	87,501,909	78,308,841	42,306,793	4,121,843	8,585,909		219,961,040

CANALS BUILT EXCLUSIVELY OR CHIEFLY FOR THE TRANSPORTATION OF ANTHRACITE.

NAMES.	Length in miles.	Cost.
Schuylkill Navigation	108	$13,207,752
Lehigh Coal and Navigation	48	4,455,000
Delaware Division	60	2,433,350
Wyoming Valley	64	2,000,000
Delaware and Hudson	108	7,164,420
Union	77	5,907,850
Susquehanna and Tide-water	45	4,857,104
Pennsylvania	151	7,000,000
Wicinisco	12	512,000
Total	673	$47,537,476

CAPITAL INVESTED IN MINING AND TRANSPORTING ANTHRACITE.

Coal lands, 300,000 acres, at $250 per acre	$75,000,000
Collieries, 437, average $100,000 each	43,700,000
Canals, 673 m., average cost $70,000 per mile	47,000,000
Railroads, 2,290 m. single track, $56,000 pr. m.	128,000,000
Total	$293,700,000

—The New England anthracite field, embracing the Portsmouth basin in Rhode Island and its continuation, the Mansfield basin in Massachusetts, is greater in area than all the Pennsylvania anthracite fields, but its value for commercial purposes bears no comparison. The

RAILROADS BUILT EXCLUSIVELY OR MAINLY FOR THE TRANSPORTATION OF ANTHRACITE.

NAMES.	LENGTH IN MILES.			Cost.
	Sidings and Branches.	Double Track.	Main Track.	
Philadelphia and Reading (total length, including leased lines, 1,266 m.)	158	151	260	$38,677,075
Delaware, Lackawanna, and Western	28	85	115	18,825,000
Delaware and Hudson Canal Company's Railroad	26	82	45	3,884,806
Lehigh and Susquehanna	8½	75	105	12,041,781
Nesquehoning Valley	2½	....	16½	1,152,968
Trescow	1	....	6	160,500
Lehigh Valley (including branches, 440 m.)	125	86½	101	19,280,780
* Central Railway of New Jersey (approximated)	?	?	75	8,000,000
* Morris and Essex (approximated)	?	?	83	8,000,000
Pennsylvania and New York	10	15	104	5,281,883
Danville, Hazleton, and Wilkesbarre	2½	....	45	1,850,600
East Mahanoy	3	....	7	391,608
Little Schuylkill	19	....	23	416,187
Mill Creek and Mine Hill	9	3¾	8¾	828,875
Mine Hill and Schuylkill Haven	100	29	29	3,905,600
Mount Carbon	2	7	7	208,259
Mount Carbon and Port Carbon	9½	2½	2½	282,815
Pennsylvania Coal Company's Railroad	10	47	100	2,000,000
Schuylkill and Susquehanna	9	....	54	1,288,490
Schuylkill Valley Navigation Railroad	8	5	11	576,840
Shamokin Valley and Pottsville	4½	....	28	1,569,450
McCauley Mountain Railroad	....	....	5½	160,500
Totals	520½	588¾	1,231¼	$128,167,912

general formation of the beds resembles that of the lower irregular beds or pockets in the southern Pennsylvania field below A; and the impure, graphitic character of the coal is the same. In both the coal exists in "nests" rather than beds, sometimes 10 and even 20 ft. thick, but often not as many inches, and frequently they disappear entirely. In the Pennsylvania anthracite fields the palæozoic sedimentary strata, between the coal measures and the igneous rocks, are between 5 and 7 m. in thickness; while the sedimentary strata below the New England field are comparatively thin, and so highly crystallized or metamorphosed by heat as to have been mistaken by the early geologists for the gneissic rocks. Dr. Edward Hitchcock, however, maintains that the whole region, embracing not less than 500 sq. m., is a true coal field, which has experienced more than ordinary metamorphic action both mechanical and chemical. He says: "The mechanical forces seem to have operated on the strata containing the coal in a lateral direction, so as not only to raise them into highly inclined positions, but also to produce plaits or folds. . . . The chemical metamorphoses which these rocks have experienced consist mainly in such effects as heat would produce." Prof. Silliman, Prof. Jackson, and Dr. Hitchcock have given favorable opinions in regard to the probable future productiveness of this field and the commercial value of the coal. The developed coal beds are three in number. Their dimensions are variable, but may be averaged from 3 to 7 ft. respectively, when in their best condition. At Portsmouth the principal bed has been mined by a slope of 600 ft. in length, inclining at 30° to 35°, to a vertical depth of 300 ft.; from the bottom of which gangways were driven 1,000 ft. in length on the strike of the bed, which increased and decreased from 16 inches to as many feet. Mining operations have been attempted in many localities in this field, but all have ended in failure, owing to the disappearance or faulty character of the coal beds. The amount of coal mined from the field has been insignificant, and no trustworthy statistics have been recorded. The product, however, when pure and solid, compares favorably with the Pennsylvania anthracite, though usually the best of it contains more water, graphite, and earthy impurities. It is probable that deep and well conducted mining operations will eventually develop this field in a remunerative manner. The diamond drill can now be used before incurring the cost of pits and mining operations, and it may reasonably be anticipated that purer coal and more regular beds will be found at greater depth.—The Virginia anthracite field, which may be appropriately termed the New river coal field, in Montgomery and Pulaski counties, in S. W. Virginia, consists of two narrow, parallel basins on Price's and Brush mountains. Price's mountain is a narrow, short synclinal ridge, which rises in the Silurian limestones of the great valley range, and is part of the watershed between the James and New rivers. In this ridge the coal is enclosed as a narrow trough or basin, with an eastern dip of 30°, while the true western dip is inverted and dips E. at an angle of 80° or 85°. Thus the bottom slate of the lower bed is the roof of the upper bed, and the basin may be generally represented by an Italic capital *V;* but the force which tilted and folded the strata in this inverted manner distorted the coal measures and crushed and ruined a large part of the coal, while slips and other forms of fault render the operations of mining in this basin uncertain and precarious. The coal of Price's mountain basin is a true anthracite, but less dense, lustrous, and pure than that of Pennsylvania. The Brush mountain basin lies at the E. base of the North mountain, and resembles the opposite Price's mountain basin in lithological structure; but the inverted strata of the W. side have been destroyed, except in a few localities, by erosion. In some few places where the inverted strata exist in this basin, they are folded back, so that the coal beds, which in their normal condition must have dipped to the west, are now lying on their opposite dip, and the strata of the entire basin in such localities dip east, abutting abruptly against the underlying sandstones or limestones. The coal of this basin is semi-anthracite. Coal has been mined in a small way from numerous localities in these basins, but to the present time (1878) it has all been drawn in wagons from the mines to the Virginia and Tennessee railroad, a distance of from 2 to 8 m. The total amount mined cannot exceed 15,000 to 20,000 tons up to the year 1878. It has been used successfully in grates, stoves, cupola furnaces, puddling furnaces, and locomotives, but has not been tested in the blast furnace. Near the surface the coal is weak and friable, but at considerable depth it becomes more dense, solid, and pure. Much aluminous and carbonaceous shale exists in connection with this coal, and sometimes excludes it entirely, forming a "fault." The entire area of these two basins cannot exceed 10 sq. m. They are merely narrow synclinal belts, with an occasional repetition or fold forming two parallel basins, seldom more than 500 yards wide inclusively. The coal-bearing strata of this range or belt, however, are much more extensive than those embraced in the New river coal field, and extend over 200 m. N. E. and nearly 100 m. S. W. It is found in Sidelong hill, a continuation of Blue or North mountains in Pennsylvania, and exists in a basin of considerable extent on North mountain, a short distance W. of Martinsburg, West Va. In this locality there are two basins, one on the E. side of the mountain and another on the W. side, or rather on the summit of the mountain. That on the east is narrow and folded in the form of a *V*, the left or E. side inverted in the usual form of this range; but that on the summit is more regularly stratified, forming a comparatively shallow basin. Here we find all the indications of a true basin of the carboniferous era. The conglomerate and the red shale (Nos. XII. and XI. of the Pennsylvania geological survey) are in regular order and position, and the lower beds of coal are identical with A, B, and C of the Pennsylvania fields, in the order of stratification, character of bed, and color of ash. The area of this small upper basin is perhaps 5 sq. m. It lies on the head waters of Back creek, which flows into the Potomac W. of Martinsburg. Yet notwithstanding the greater regularity and order of these anthracite beds, they are faulty and too small and impure to be mined for ordinary commercial purposes. The beds range from 3 to 5 ft. in thickness, of which two thirds may produce marketable coal. This range of coal-bearing strata may be traced with occasional gaps from this place to New river. The coal beds have been developed in a small way at the Dora mines on the North fork of the Shenandoah, W. of Staunton, where anthracite of good character has been mined for local use. The next point at which the coal has been mined is W. of Fincastle on Catawba creek. From here it has been dug into in many places to the Brush mountain basin on New river, and from New river it has been opened at many points to the Tennessee line; but the only localities yet developed, where this range contains beds in workable condition and productive of good coal for ordinary purposes, are those particularly described, including the Dora mines, which however are the most doubtful. This range of coal deposits has always been considered by geologists as belonging to the proto-carboniferous or false coal measures. Recent investigations have cast doubt on this classification, and those most familiar with the geology of the region are inclined to place it in the true coal measures as identical with the strata of the Pennsylvania coal fields.—Besides the principal anthracite fields already described, there are other small, partially developed, and less known deposits of anthracite in Arkansas, New Mexico, Sonora, and Oregon.—Of the remaining anthracite deposits of the world, those of France are most largely developed. The first and most extensive is a continuation of the Belgian coal field, in the department of Le Nord. The coal is of a dry or semi-anthracite character in a portion of the French extension, and about one half the coal products of this field is denominated anthracite in the French reports, but it is not strictly anthracite. The other French fields producing anthracite are named from the departments of Pas-de-Calais, Calvados, Sarthe, Maine-et-Loire, Loire-Inférieure, Corrèze, Puy-de-Dôme, Haute-Saône, Tarn, Haute-Loire, Ardèche, Isère, and Hautes-Alpes. The total annual production of coal in France is now (1873) over 10,000,000 tons, of which about 2,000,000 tons is anthracite and semi-anthracite, and of the latter more than one half is the product of the field of Le Nord. The European anthracite field next in importance to these is that of Donetz in S. Russia, between the Dnieper and Donetz rivers, which is perhaps the largest connected field containing anthracite yet developed. It embraces over 8,000 sq. m. of coal area, but, like the South Wales and Pennsylvania anthracite fields, one end contains anthracite and the other bituminous coal beds, according to Murchison; while anthracite and bituminous beds are found in the same locality, and the undulations of the strata, which dip from 20° to 70°, indicate a close resemblance to the peculiarities of the Pennsylvania anthracite fields. An analysis of this anthracite gave 94·234 per cent. carbon. Anthracite also exists in Spain, Portugal, Germany, Austria, Norway, Persia, India, China, and South America; and generally anthracite is found in connection with the altered or metamorphic rocks, which accompany all great coal formations to a greater or less extent.—Anthracite undoubtedly owes its existence to a superior heat or a comparatively high temperature during its formation. The hardest and most dense anthracite is always found where the coal has been subject to a high temperature; but where the heat has been most intense, graphite rather than coal is found. In the New England field the outcrops of the coal beds frequently yield plumbago, which is collected and sold as "British lustre," and nests of pure graphite are found in the beds at considerable depth. An analogous condition is found in the pockets of carbonaceous coal which exist below A in the southern Pennsylvania field. The proportions of carbon are due to the varying degrees of heat to which the coal or the elements forming anthracite have been subjected. This fact is fully illustrated in the Pennsylvania anthracite beds, where the lowest contain the most carbon and the highest (in the measures) the most volatile matter. Where the coal is nearest to the igneous or plutonic rocks, whether granitic or metamorphic, whether in the deepest parts of the coal basins or on their edges, the conditions are the same, and all true coal fields are alike in these conditions. It is true, the Richmond (Va.) bituminous coal field is formed in the crater of an extinct volcano; but that field is a late creation of the Jurassic period, and was deposited when the earth and the rocks beneath it were comparatively cool, and even there a trap dike is intruded—evidently long after the completion of the coal field—between the beds. The effect of this heated and volcanic mass of rock has been to coke a coal bed 60 ft. beneath it, and burn one 10 ft. above it to a graphitic cinder. The general effect of trap intrusions seems to be the same in all cases, but the altered bituminous coal under such circumstances is rather a coke than an anthracite, which differs greatly in appearance, though the constituents are the same. Prof. H. D. Rogers explains the formation of anthracite by supposing it to be the result of altered bituminous coal metamorphosed by intense heat, and of course by heat induced subsequent to the formation of the bituminous beds; and he further explains the escape of the volatile portion of the latter as gas through cracks and openings caused by the plication of the anthracite strata. This plication follows closely the general type of the eastern palæozoic rocks, which are intensely crushed and folded near the contact of their edges with the igneous or granitic rocks, and much less plicated and distorted in a western direction. This fact undoubtedly led to the above theory, which seems as natural as it is ingenious: but the facts do not sustain the theory. 1st. The upper beds and strata are more dislocated, distorted, and crushed than the lower beds, as plainly demonstrated by the plication of the strata on the apex of the leading anticlinals in the southern field. 2d. The measures are more plicated and crushed at the western extremity of this field, in the Dauphin or south prong, than at the eastern extremity; yet the coal of the latter is a dense, hard anthracite, while that of the former is semi-bituminous. 3d. The heat must have been most intense during the early stages of coal formation. In view of these facts, it has recently been contended that true anthracite is not a metamorphosis of bituminous coal, but as much a normal creation as the bituminous variety itself from a combination of its constituents under superior heat, however the original elements were produced. (See COAL.)—The faults and irregularities of the anthracite beds and strata are the result of crust movements, and the plication of the distorted and crushed rocks indicates contraction, both lateral and perpendicular, as the cause. The effects of a combined lateral and perpendicular movement are simply those which are evident in the plication of the anthracite beds of the southern Pennsylvania fields, and their accompanying shales; but the crust movements have been slow and uniform, bending rather than breaking the strata, except in cases of sharp foliation of anticlinals or synclinals. Where the folding has been most abrupt the strata are inverted, and the coal is crushed and partially destroyed. The coal beds thus distorted are always subject to faults of the peculiar character described in the New England and New river coal fields, as well as those of Pennsylvania. Such faults are more frequently met with in the upper than in the lower beds of the latter. A fault is rarely met with in the great white-ash beds B, D, and E, except where they are inverted or seriously dislocated by the plicating movements. The dislocations of American coal beds are rarely vertical, and never to any great extent, as in the English fields, where this form of fault is peculiar. The nearest approach to this in the former is a "slip" which may slide one portion of a bed over the other, or remove it a few feet up or down. In the anthracite fields, however, faults are much more numerous than in the bituminous fields of England or the United States, but these are generally of the characteristic form peculiar to highly plicated strata before described. There are, however, other less frequent forms of fault, such as the occurrence of large areas of soft carbonaceous shale in place of the coal; long ribbon-like streaks of rock or slate in the coal from the top of the bed, apparently to fill a crack in the same; or the interposition of rock and slate between the strata of a bed, dividing it so as to render valueless sometimes one or both divisions. These faults do not affect the accompanying beds. The preceding are such as are strictly denominated faults in the Pennsylvania anthracite fields; but the ever-varying dip of the strata, the change of strike incident thereto, and the general irregularities of both coal bed and accompanying strata, would be denominated faults in the great bituminous fields of the United States or England.—The use of anthracite as a common fuel is recent. It was long supposed to be an inferior kind of coal, and the creation of an earlier period than the true carboniferous; even now there are a few professional men who adhere to this exploded theory. The first attempts to use it as fuel were as a substitute for wood or the free-burning bituminous coals, where a draught of air through the mass is not absolutely necessary, as in the case of anthracite. On account of this difficulty of ignition, and the prevailing ignorance in regard to the best methods of using it, anthracite was slow to be appreciated. In 1818 it was considered inferior in Wales, and was but little used for any purpose; and though known and tested as a valuable fuel in the United States arsenal at Carlisle, Pa., in 1776, and by smiths on the Susquehanna generally even at an earlier date, it was only in 1812 that it was successfully used in Philadelphia, and there the mode of burning it was discovered by accident. The general trade only commences with a few tons in 1820. (See table.) At first the increase of consumption was slow, but so soon as its use and advantages became generally understood, it assumed the first place in the list of combustibles. For household purposes it is preferred not only on account of its cleanliness and the absence of smoke and the peculiar odor of bitumen, but also on account of its durability and long continued and uniform heat. For war steamers, where the conspicuous smoke of bituminous coal is exceedingly objectionable during hostile movements, anthracite has been fully tested and found superior, not only because of the absence of smoke, but of its good steam-producing qualities, its duration at high temperatures, and the consequent maintenance of a steady uniform steam power. For the economical combustion of anthracite a strong draught rather than an abundant supply of air is required. In common use, however, where chimney draught is ordinarily employed, these two requirements are antagonistic, as far as economy is concerned. To obtain a draught strong enough to pass sufficient air through the coals, a high and hot chimney is required, which absorbs and carries off the largest proportion of caloric from furnaces as commonly constructed. The coal is rarely burned to carbonic acid by direct combustion in this manner, but rather to carbonic oxide, which is lost, and more than half the fuel is thus wasted. The first or direct combustion, producing carbonic oxide, generates about 1300° C., while the carbonic oxide is capable of producing over 2100° C. of heat in addition; but when anthracite is burned to carbonic acid direct in properly constructed gas-burning furnaces, the temperature is increased to 2400° C. The volume of heat or total heating effect is, however, in favor of carbonic oxide as fuel, and it would be much more economical and generally useful to convert anthracite or bituminous coal to carbonic oxide before using it as a fuel. In the blast furnace, however, where anthracite is preëminent, the coal must be used in its solid condition; but here, in well constructed furnaces, the total heating effect of the coal is utilized. But it cannot be claimed that anthracite is a superior fuel for all purposes, because bituminous coal can be used in all cases, while anthracite cannot be used in the present state of the arts for the production of illuminating gas. Where a long hot flame is required, as in puddling furnaces, hydrogenous coal is more available; and for welding heats, where hollow fires are desirable, the latter class of coal is also used. But under proper combustion, anthracite, as the purest form of carbon available for fuel, will yield a higher temperature than any other kind of fuel.—The earliest record of the use of anthracite for the production of iron is in 1826, when a small furnace built under the direction of Messrs. White and Hazard of the Lehigh coal company, near Mauch Chunk, Pa., was tried with anthracite and cold blast; but, though several pigs of anthracite iron were made, the furnace chilled and the attempt proved a failure. Several other experiments were made both on the Lehigh and the Schuylkill, which were successful in the production of anthracite iron, but failed of practical results. Attempts had been made prior to this time to use anthracite for the production of iron in the blast furnaces of Wales; but nothing definite is given in regard to the date of these experiments until after the introduction of the hot blast by Neilson in 1831, or its more general use in 1833. Mr. David Thomas then conceived the idea of using anthracite with hot blast, and induced his employer to try the experiment. A coke furnace was accordingly altered during 1836, and provided with a hot-blast arrangement; and in February, 1837, anthracite iron was successfully made in Wales for the first time. In 1837 the Lehigh coal and navigation company, attracted by the success of the Welsh furnace, sent one of their directors to Wales, who engaged Mr. Thomas to start a furnace on the Lehigh, which was successfully accomplished in June, 1839. The "Pioneer Furnace" at Pottsville, built by William Lyman of Boston, had been put in blast a few months previous, after the directions of Mr. Thomas. For this Mr. Lyman was awarded a premium of $5,000 which had been offered by Burd Patterson of Pottsville and Nicholas Biddle of Philadelphia for the profitable production of anthracite iron, and which was paid at a banquet given at Mt. Carbon early in 1840. Since then the Thomas and Crane iron works on the Lehigh have grown to mammoth establishments, and are now capable of producing 100,000 tons of pig iron per annum; and the total annual production of anthracite iron has now (1873) reached 875,000 tons.

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* This table is from official sources, excepting the Morris and Essex and the Central railway of New Jersey, which were not built exclusively as coal transportation lines.

ANTHROPOLOGY, the science of man. See ANATOMY, ARCHÆOLOGY, COMPARATIVE ANATOMY, ETHNOLOGY, MORAL PHILOSOPHY, PHILOSOPHY, AND PHYSIOLOGY.

ANTHROPOMORPHITES (Gr. ἄνθρωπος, man, and μορφή, form), those who believe that God possesses a human shape. Audius, a Syrian layman (340), taught that God essentially exists in human form, and opposed the authority of the clergy. He was excommunicated, and his sect disappeared after about a century. In the 10th century anthropomorphism was revived, but did not attain any prominence as a doctrine.

ANTIBES (anc. *Antipolis*), a town and seaport of France, department of Alpes-Maritimes, built on a promontory jutting into the Mediterranean, 15 m. S. W. of Nice; pop. in 1866, 6,829. It has fortifications erected by Vauban and some Roman antiquities, including an aqueduct in good preservation. The chief industry and trade are in salted fish, dried fruits, wine, and olive oil. The town was founded by the Greeks of Massilia (Marseilles) in the 4th century B. C. Under the Romans it was a military station and an important seat of commerce, but it was ruined by the barbarians and Saracens. In later times it was strongly fortified, and successfully withstood a siege of the English and Imperialists in 1746.

ANTICHLOR, in chemistry, any substance capable of eliminating the excess of chlorine or of free hypochlorous acid left in goods and paper after the process of bleaching by chloride of lime. Several agents can be employed, and they generally act by converting the chlorine into an innocuous salt. One of the first substances employed for this purpose was the sulphite and bisulphite of soda patented by Henry Donkin in 1847. In 1853 these salts were superseded by the hyposulphite of soda, which has now become the principal antichlor of commerce. Sulphide of calcium, prepared by boiling sulphur with milk of lime, has also been used as an antichlor; so likewise has a solution of protochloride of tin in hydrochloric acid. In the latter case, however, it is necessary, after the completion of the bleaching process, to add carbonate of sodium, in order to neutralize the free hydrochloric acid, which would otherwise act as injuriously as the free chlorine itself. The precipitate of oxide of tin thereby produced is quite white and soft, and does not interfere with the subsequent stages of the paper manufacture. Coal gas was also used as an antichlor in paper making as early as 1818, but it is not so convenient as the agents mentioned above. The products formed by the action of chlorine (or hypochlorous acid) on sulphite or hyposulphite of sodium are sulphate and chloride of sodium, both of which are innocuous and easily removed by washing.

ANTICHRIST (Gr. ἀντί, against, or in place of, and Χριστός, Christ), a term which occurs five times in the Bible, but only in the first and second epistles of John. These passages recognize the previous teaching that "Antichrist shall come;" declare the existence even then of "many Antichrists," who "went out from" the Christians, but "were not of" them; and characterize as an Antichrist him "that denieth the Father and the Son," or "confesseth not that Jesus Christ is come in the flesh." Most interpreters identify Antichrist with the "man of sin" (2 Thess. ii. 3); many also with the "little horn" of Daniel's fourth beast and the "king of fierce countenance," with the Apocalyptic beast and false prophet, and with the false Christs and false prophets foretold in Matt. xxiv. 5, 11; but all these are controverted points. The numerous representations of Antichrist given by Biblical critics and theologians may be arranged under the following five heads: 1. An individual yet future. Thus most of the early Christian fathers represent the "many Antichrists" of the apostle's day as forerunners or types of a terrible future Antichrist—a person (of the tribe of Dan, according to Aretas, Bede, &c.) armed with Satanic powers (Satan himself, say some)—who is to come just before the final and glorious appearance of Christ, and then to be destroyed by Christ. 2. A polity or system. Thus the Waldenses, Wycliffites, reformers of the 16th century, and others, make Antichrist to be the papal system, or the pope as representing the Roman Catholic polity; others, imperial or pagan Rome; others, Mohammedanism, or popery and Mohammedanism, or Judaism and pagan Rome and papal Rome, &c. 3. An individual already past. Thus Antichrist has been found by different Roman Catholic and Protestant expositors in one or another heathen emperor of Rome, Jewish leader, false Messiah, or heresiarch. 4. A class united in opposition to Christ. This opinion, held by Bengel, Macknight, Bishop Wordsworth, &c., makes Antichrist a collective term, equivalent to the "many Antichrists" of 1 John ii. 18, or the embodiment or representative of a limited or unlimited class of those who set themselves up against Christ, as the false prophets or teachers about the time of the destruction of Jerusalem, or all false teachers in every age, or the particular class who deny that Jesus is the Christ, or all heretics, &c. 5. An evil principle personified. This opinion, held by Koppe, Nitzsch, and others, is naturally connected with the view that Satan is not a person, but only evil personified.—It may be added that Jewish rabbinical books describe Antichrist under the name of Armillus, who, it is said, will defeat and slay the Messiah Ben Joseph, but will himself be defeated and slain by Messiah Ben David; and that Mohammedan traditions represent the Jewish Messiah Ben David as himself Al-Dajjal (Antichrist), who will be slain by Jesus.

ANTICOSTI, an uncultivated island in the gulf of St. Lawrence, 120 m. long and 30 m. wide in the centre, narrowing toward both ends. It divides the gulf into a N. and a S. channel. The E. point is in lat. 49° 5′ N., lon. 62° W.; the

W. point in lat. 49° 48′, lon. 64° 35′. Along a great part of the coast there is a dangerous belt of reefs uncovered at low tide. There are two harbors comparatively safe at all times: one at Gramache or Ellice bay, near the W. end, and the other at Fox bay on the northwest. The coast line on the S. side rises from 20 to 30 feet above the water; on the N. a succession of ridge-like elevations, separated by depressions, rise from 200 to 500 feet. On the S. side there are excellent peat beds 80 m. in length and 2 in width, with a depth of from 3 to 10 feet, and marl beds of considerable thickness. There are three lighthouses on the island.

ANTICYRA. **I.** An ancient city of southern Thessaly, on the Spercheus, famous for producing the best hellebore, which was regarded by the ancients as a cure for madness. **II.** A city of Phocis on the Corinthian gulf, also celebrated for the production of hellebore. The Anticyræans are said to have been expelled from their city by Philip of Macedon after the close of the sacred war. It was taken in a subsequent age by the Roman general Lævinus, and given up by him to the Ætolians. It was occupied during the Macedonian war by the consul Flamininus, for the sake of its harbor, which afforded a secure retreat for the Roman fleet. The site of Anticyra is still discernible on the shore of the Corinthian gulf, and known as Aspra Spitia, or "the white houses."

ANTIDOTES (Gr. ἀντί, against, and διδόναι, to give), a term formerly used to signify remedies or preservatives against sickness, but now applied only to means for counteracting the effect of poisons. To get rid at once of the poisoning substance, to hinder its absorption, or to counteract its effects, are the general results to be sought for. The first of these objects is attained, when the poison is in the stomach, either by the stomach pump or an emetic. If a stomach pump is not at hand, an ordinary elastic syringe with a stomach tube may be made to do duty in washing and pumping out the stomach. The best emetics are those which act rapidly, especially mustard, which is almost always at hand, sulphate of copper (blue vitriol), or sulphate of zinc (white vitriol), the vomiting being encouraged and kept up by tickling the fauces, giving large draughts of warm water, &c. If the poison has been thrown into or under the skin, as by the bites of serpents or mad dogs, or wounds from poisoned weapons, it may be sucked out by the mouth or a cupping glass; the wounded part may be excised, or a ligature placed so as to hinder the entrance of the poison into the system. Dr. Fayrer's elaborate experiments have shown that these procedures, to be of any avail, must be put in force with the utmost promptness, since only a few seconds suffice for the poison of venomous serpents to enter the circulation. The cauterization of such wounds either with the hot iron or powerful chemical agents, such as nitric acid, nitrate of silver, and ammonia, has been practised.—Many substances may be rendered insoluble or comparatively inert in the stomach by appropriate chemical reagents. Strong acids may be neutralized by magnesia, chalk, or soap; caustic alkalies by vinegar. We may use for arsenic freshly precipitated sesquioxide of iron, which every druggist should have the materials at hand for preparing at short notice. That which has been kept under water, or the so-called subcarbonate, may be used in case the first is not ready. The light magnesia, or freshly precipitated gelatinous magnesia, has also been used. A mixture of chalk and castor oil, of the consistence of cream, is said to envelop the particles of arsenic still adherent to the stomach after it has been washed, and render them harmless. For bichloride of mercury, albumen (eggs), gluten (wheat flour), or caseine (milk) may be used, but should at once be followed by an emetic, as the precipitate formed is not absolutely insoluble. With lead and baryta, sulphates form insoluble precipitates; with sulphate of copper or zinc carbonate of soda, and with oxalic acid carbonate of lime (chalk) may be used. The vegetable astringents (galls, tannic acid, strong tea), and also a solution of iodine in iodide of potassium, form insoluble precipitates with some of the alkaloids.—The antidotes which fulfil the third indication, counteracting the effects of poisons, are not so well determined. Inflammation from irritant poisons is to be treated on general principles. Opium narcotism is to be treated by external irritants, such as cold affusion or forced exercise and strong coffee. The efficacy of belladonna as an antidote to opium, and *vice versa*, is not established. For prussic acid ammonia may be cautiously used. The symptoms of nux vomica and strychnia may be partially controlled by chloroform, chloral (if there is time for it to act), or bromide of potassium. Aconite has been proposed. Aconite poisoning calls for stimuli, as alcohol and ammonia.

ANTIETAM, Battle of, fought by the national army of the Potomac, under Gen. George B. McClellan, and the confederate army of North Virginia, under Gen. Robert E. Lee, between Sharpsburg and the Antietam creek, an affluent of the Potomac river, Sept. 16 and 17, 1862. After the defeat of the army of the Potomac in the seven days' fighting on the line of the Chickahominy, the confederates prepared for an invasion of Maryland, worsted Pope's army at Cedar Mountain, in the second battle of Bull Run, and at Chantilly, crossed the Potomac near Leesburg, and concentrated their forces at Frederick. Meanwhile the national army had been withdrawn from Harrison's Landing and consolidated at Washington with Pope's command, and the whole, under McClellan, moved out to meet Lee. The right wing, consisting of the 1st and 9th corps, was under Burnside; the centre, composed of the 2d and 12th corps, was under Sumner; and the left wing, composed of the 6th corps, was under Franklin. In this order McClellan marched by the Rockville turnpike, the right wing of his army extending toward the Baltimore and Ohio railroad, and the left toward the Potomac. His advanced guard entered Frederick as the confederate rear guard was leaving it. At this place, on Sept. 12, he became acquainted with the disposition of Lee's forces, as well as with his immediate plans, through a copy of Lee's marching orders which one of the confederate commanders had inadvertently left behind him. Lee, having captured all the outlying detachments of the national army, including that in the stronghold of Harper's Ferry, and thus secured his communication with Richmond, concentrated all his available forces, choosing his position in front of Sharpsburg, in the angle between the Potomac, which covered his rear, and the Antietam, whose deep bed and precipitous sides covered his front. Lee's line, forming almost a semicircle about the village, covered all the roads concentrating at that place; its right wing rested on the heights dominating the creek, and stretched along it, sweeping all the crossings for more than half a mile; the centre occupied the open fields and patches of wood extending to the Hagerstown road, and the left rested upon the Potomac. McClellan's army approached the battlefield along the turnpike leading from Keedysville to Sharpsburg, his main body going into position on the left bank of the Antietam on the afternoon of Sept. 15. No fighting took place on this day. The greater part of the 16th was passed in harmless cannonading, but late in the afternoon McClellan threw forward Hooker's corps, with orders to force a passage of the Antietam by the upper one of the four stone bridges spanning the creek in that neighborhood. This bridge, being beyond the reach of the confederate line, had been left undefended, and Hooker's crossing was therefore quickly and easily made. Pushing forward at once through a narrow piece of woods, he soon struck the confederate left under Hood, and after a sharp skirmish, terminating with nightfall, in his favor, his corps rested on their arms near the Hagerstown road, almost in contact with the enemy's line. This advance served to place one corps of 18,000 men in a good position to give battle as well as to uncover the other crossings of the Antietam as far down as the Keedysville road, thus rendering it easy for McClellan to secure his initiatory movement, by sending Mansfield's 12th corps, under cover of darkness, to strengthen Hooker. On the morning of the 17th the disposition of the combatants was as follows: Lee's position was substantially unchanged; his entire army, estimated at about 65,000 strong, was formed in a semicircular line covering the roads converging at Sharpsburg. Hooker's and Mansfield's corps of McClellan's army had crossed the Antietam and held advanced positions on the extreme right; Sumner's corps held itself in readiness to cross; Porter's corps was in reserve, covering the Keedysville bridge, but separated from the enemy by the creek; and Burnside's corps occupied the extreme left, and was also separated from the confederate position by the Antietam. The aggregate strength of these corps was about 85,000 men; but being partly on one side and partly on the other side of a stream which could hardly be crossed anywhere except by a bridge, and which was particularly easy to defend, the superior strength of the Union army counted but for little in the bloody conflict which followed. McClellan's plan was for Hooker and Mansfield, supported by Sumner, to attack the confederate line, and engage it so closely as to permit Burnside, advancing simultaneously, to force a passage at the lower bridge, and thus unite all the corps except the reserve on the further side of the Antietam, with their entire strength available for the final struggle. Hooker's corps held a position close to the enemy's line, and was therefore forced to begin skirmishing almost as soon as it was light. After gaining some slight advantages it attacked with great fury, and succeeded in forcing Lee's left under Jackson backward for nearly half a mile before it received the slightest check. Hooker gave his men a short breathing spell, and dashed forward again; but his divisions were already fatigued as well as greatly shattered by their bloody work. Meeting the reserves of the enemy's left, they were in turn driven back to the position from which they advanced less than an hour before, notwithstanding Mansfield had in the mean time hastened forward to join in the conflict. This gallant veteran lost his life in trying to regain the ground lost by Hooker, and, although aided by a terrible fire from the reserve artillery of the Union army, stationed near the Keedysville bridge, his corps was also forced to retire to the position from which it had advanced. McClellan now ordered Sumner to advance, and this resolute commander accordingly made his appearance on the battlefield about 9 o'clock, and with all the precision of a parade moved his corps of four divisions against the confederate line, over a part of the field somewhat to the left of that covered by Hooker and Mansfield, but directed mainly against the woods to the west of the Dunker church on the Hagerstown road. The confederates, having had time to rectify and strengthen their lines, received this formidable attack with steadiness; but so fierce was the onset of Sumner's right division under Sedgwick, that the confederate division confronting him was driven back into and beyond the woods, when it was strongly reënforced by troops which had arrived upon the field only that morning. The confederates now made a spirited counter attack, directing their movement mainly against Sedgwick, who was in echelon with the other divisions of Sumner's corps, and therefore poorly supported by them. The fighting which ensued was characterized by the greatest bravery, but when it ceased Sumner's entire corps was also defeated, and the enemy's line completely restored. By 11 o'clock half of the Union army and nearly all of the confederate army had been engaged. The latter, standing in a close and compact line, on its own chosen ground, had been able to act as a unit, while the former at the outstart was divided by the Antietam, and had spent its force in gallant but disconnected attacks, resulting in defeat by detail, accompanied by an immense loss of life. Had Lee known at any time during the afternoon the extent of the injury he had inflicted upon the right wing of the Union army, and assumed the offensive, it is scarcely to be doubted that he would have gained a complete victory notwithstanding the timely arrival of Franklin's corps on that part of the field. Neither Burnside's nor Porter's corps had yet been seriously engaged, although the former had been ordered to attack simultaneously with the other corps. His failure to carry the bridge in his front and to effect a lodgment beyond was due to the fact that it was swept by the sharpshooters of the enemy's right, occupying the commanding hillocks close to the borders of the creek. The confederate position here was very strong, and, being covered by the Antietam, almost entirely impassable in this portion of its course, was practically unassailable. Burnside advanced promptly as ordered, but his foremost troops encountered such a galling fire that they could not even reach the bridge, much less carry it. After several hours' delay Burnside succeeded in throwing one brigade across the creek by a ford which had been discovered some distance below, thus relieving the pressure in his front, and permitting the main body of his corps to cross by the bridge and to secure a good position on the right bank of the creek. After reforming his lines Burnside advanced, carried the heights beyond, and pressed back the enemy's right several hundred yards; but his attack not being supported by detachments from the other parts of the army, as it should have been, he was defeated and driven back almost to the creek, as the other corps had been. Night ended the conflict with both armies concentrated and confronting each other on the W. side of the Antietam. On the 18th McClellan stood on the defensive. During the day he received the reenforcement of two strong divisions under Humphreys and Couch, and then resolved to attack the next day; but meantime Lee had made good his retreat to the south side of the Potomac. McClellan's loss in this action was 2,010 killed, 9,416 wounded, and 1,043 missing; total, 12,469. Lee's army, having fought on the defensive throughout, and frequently under cover, is estimated by confederate writers to have lost only about 9,000. This battle was followed rather by negative than positive military results. The confederate army retired to Virginia and assumed a defensive attitude; the people of Maryland did not rise in rebellion, and the national capital did not fall into the hands of the invaders. On the other hand, the political measure which followed it was positive and far-reaching in its effects. President Lincoln had made a solemn vow that if Gen. Lee was driven back from Maryland, he would crown the result by issuing a proclamation abolishing slavery, which was done, at least conditionally, on the 22d day of September, 1862.

ANTIGONE, one of the tragic characters in the Greek legends, a daughter of Œdipus by his mother Jocasta. When Œdipus, after discovering that he had killed his father and married his mother, put out his eyes in despair and went to Attica, Antigone guided him on the way and attended on him till his death. She then returned to Thebes, where Hæmon, son of the tyrant Creon, became enamored of her. The brothers of Antigone, Polynices and Eteocles, having fallen in the war for the possession of Thebes, and she having attempted to bury Polynices in defiance of an edict of Creon, the tyrant ordered her to be buried alive or to be shut up in a cave, and Hæmon slew himself by her side. The story of Antigone was a favorite subject with the great tragic poets of Greece, and is told with some variations.

ANTIGONUS. I. The Cyclops (so called from having lost an eye in battle), a Macedonian officer of Alexander the Great, and subsequently king of Asia, slain at the battle of Ipsus in Phrygia in 301 B. C. At the distribution of Alexander's empire, Antigonus received as his share the greater Phrygia, Lycia, and Pamphylia. Attacked by Perdiccas, he took refuge at the court of Antipater, regent of Macedonia and Greece. On the death of Perdiccas in Egypt (321), Antipater made a new distribution of the Asiatic provinces. Antigonus had Susiana added to his former dominions, and to him was committed the charge of annihilating Eumenes, the ally of Perdiccas. By bribing one of his officers, Antigonus gained a victory over Eumenes and shut him up in the fortress of Nora in Cappadocia. In the mean time Antipater died (319), and Antigonus in his turn began to aspire to that universal dominion at which Perdiccas had aimed. First destroying Eumenes (316), he occupied Susa, the Persian capital, and wrested Babylonia from Seleucus. A coalition was now formed against him by Seleucus, Ptolemy of Egypt, Lysimachus of Thrace, and Cassander, the son of Antipater; but Antigonus, with the aid of Aristodemus of Miletus, succeeded in combining many of the Hellenic cities in his support, and, though Seleucus recovered Babylonia, the Macedonian garrisons were expelled from the Peloponnesus, Eubœa, Thebes, and the greater part of Phocis and Locris. After a truce of one year, during which Cassander murdered Roxana and the young Alexander (311), the war broke out again. The restored Athenian democracy paid to Antigonus and his son Demetrius Poliorcetes extravagant honors. Having defeated Ptolemy in a sea fight off Salamis in Cyprus (306), Antigonus threw off the pretence hitherto kept up by the generals of Alexander that they were holding merely for his heirs, and assumed the title of king. Ptolemy, Lysimachus, and Seleucus immediately called themselves kings also. Cassander, general of Macedonia, held back a little longer, but soon followed. Cassander, driven out of Greece by Demetrius (303), now formed a league against Antigonus with Seleucus and Ptolemy. In August, 301, the armies met at Ipsus. Antigonus and his son had upward of 70,000 foot, 10,000 horse, and 75 elephants; the coalition had 64,000 foot, 10,500 horse, 400 elephants, and 120 armed chariots. Demetrius defeated Antiochus, the son of Seleucus, but pressed him too far in pursuit, so that Seleucus cut him off. The Thracian archers of Lysimachus broke the centre, where Antigonus, now at the age of 81, was commanding. He would not flee, saying Demetrius would come and help him, and died on the field of battle, leaving the victory to those who represented the principle of a balance of power in the world. **II. Antigonus Gonatas,** king of Macedonia, grandson of the preceding, and son of Demetrius Poliorcetes, born in 319 B. C., died about 240. He is supposed to have received his surname from his native village of Gona or Gonni in Thessaly. When his father was captive in the hands of Seleucus, king of Babylon, Gonatas offered to take his place. The affairs of Macedonia having fallen into confusion after the invasion of the Gauls, Ptolemy Ceraunus having been slain by them, and Sosthenes having died, Antigonus entered Macedonia with a small force, drove out the Gauls, and was accepted by the Macedonians as their king, 277 B. C. But Pyrrhus, king of Epirus, expelled him in 273, and he fled to the Peloponnesus. On the death of Pyrrhus shortly afterward he recovered Macedonia, was again expelled by Alexander, son of Pyrrhus, and again reinstated by his own son Demetrius. Nearly all that is known of his subsequent reign is his attempt to prevent the formation of the Achæan league. He was succeeded by his son Demetrius II. **III. Antigonus Doson,** king of Macedonia, born in 280 B. C., died in 220. His surname was given him to signify that he was always promising gifts which he never gave. He was an illegitimate grandson of Demetrius Poliorcetes, and in 229 was named guardian of Philip, the young son of Demetrius II., whose widow he married. The Macedonian nation preferred his rule on account of his military talents, and chose him to be their king. He was successful in his wars for the suppression of the Dardanian, Thessalian, and Mœsian revolts. In the affairs of the Peloponnesus he took the part of Aratus and the Achæan league against Cleomenes and the Spartans. He defeated Cleomenes decisively at Sellasia in 221, and took the city of Sparta, but was recalled by a revolt of the Illyrians, whom he defeated. He was succeeded by his ward Philip V. **IV.** King of the Jews, and the last of the Asmoneans, born in 80 B. C., died in 35. He was the son of Aristobulus II., and was made prisoner and sent to Rome by Pompey. He escaped, headed a revolt in Judea, and was taken a second time by Gabinus, who sent him again to Rome. Julius Cæsar permitted him to return. He was placed on the throne of Judea by the Parthians in 40 B. C., and was besieged in Jerusalem by Herod and Sosius, a lieutenant of Mark Antony. He was taken, sent to Antony, scourged, and put to death.

ANTIGUA, one of the British West India islands, in the Leeward group, 40 m. N. of Guadeloupe, about 18 m. in diameter; area, 108 sq. m.; pop. in 1871, with the adjacent island of Barbuda, 35,157, including 2,146 whites. It is the residence of the governor of the Confederation of the Leeward Islands, who is also governor of Antigua. There are no rivers, and the coasts are generally dangerous to shipping; but there are three good harbors: St. John's, the capital, on the W. side; English Harbor, on the S., where there is a large dockyard and a royal mail packet station; and Parham on the N. The revenue in 1869 amounted to £38,586, the expenditure to £39,252, and the public debt to £54,481. The chief products consisted in 1866 of 17,330 hogsheads of sugar, 7,852 puncheons of molasses, and 696 of rum; and the total tonnage of vessels entered and cleared, exclusive of coasting trade, was 43,906. The total exports in 1869 were £200,973, and the imports £174,357.—Antigua was discovered by Columbus in 1493. A few English settled there in 1632. In 1666 a grant of it was made by Charles II. to Lord Willoughby. After an interval of French occupation, which laid waste the island, it was again settled by Col. Codrington and formally ceded to Great Britain (1667). The legislature liberated the slaves, numbering about 30,000, unconditionally in 1834. The sum awarded for their emancipation was nearly £426,000, including those of Anguilla. The island contains besides the capital five towns, and about 100 villages of emancipated slaves. Antigua is one of the Confederation of the Leeward Islands. This Confederation commenced in May, 1872, Sir Benjamin C. C. Pine being governor.

ANTI-LIBANUS, or **Anti-Lebanon,** a mountain ridge of Palestine, one of the two offsets of the Taurus which are thrown off from that range as it passes the N. E. point of the Mediterranean and take a southern direction parallel to each other, as well as to the coast. The western and highest of these ranges, or in a narrower sense its main portion, is the Libanus or Lebanon; the eastern is the Anti-Libanus, called by the natives Jebel esh-Shurki. In the central part of their course they are separated by the valley of Cœle-Syria, 20 m. in breadth. To the south the Anti-Libanus sends off a spur which unites with the Libanus, and so separates the interlying valley into the northern or Syrian, and the southern or valley of Jordan. Through the northern flows the Orontes or Aasy. In the heights of Hermon, the uniting spur, and the highest land of the Anti-Libanus range (9,000 feet), rises the Jordan, which flows to the south; between it and the Orontes rises the Leontes or Litany, which, coursing to the S. W., enters the Mediterranean. The Anti-Libanus range is lower than the Libanus, and less continuous. Geologically it is less fossiliferous, as its limestones approach a crystalline character, giving more striking evidences of volcanic agency. It lacks also the far-famed cedars of Lebanon, its foliage being mostly of white poplar. It abounds in small lakes enclosed in its small table lands, a characteristic mostly wanting to the Libanus range.

ANTILLES, a name of somewhat loose application, but generally given to two groups of the West India islands. The name of Antilla is sometimes supposed to have been applied by Columbus to his first discoveries in the new world, because a continent of that name had previously been believed to exist W. of the Azores. Others derive the word from *ante islas* (forward islands), and apply it to the Caribbean group. At the present day geographers generally distinguish Cuba, Hayti, Porto Rico, Jamaica, and the small neighboring islands of Caymanbrack, Great and Little Cayman, and Isla de Pinos as the Greater Antilles; and the Windward group or Caribbeans, extending in a semicircular line from Porto Rico to the mouth of the Orinoco, as the Lesser Antilles. (See WEST INDIES.)

ANTI-MASONRY, a political movement which originated in the state of New York in 1827. In the autumn of 1826 William Morgan, a mechanic of Batavia, N. Y., who was reported to be about to publish a volume exposing the secrets of the order of freemasons, of which he had been a member, was kidnapped and carried off. Committees of vigilance and safety were formed, and an investigation initiated, which resulted in tracing the abductors and their victim westward to Fort Niagara, near Lewiston, N. Y., whence it appeared that Morgan had been taken out upon Lake Ontario in a boat and drowned. This was the final conclusion of those who prosecuted the investigation, though reports were repeatedly current that Morgan had been seen alive and at liberty months after his reported abduction. One of these accounts placed him in Smyrna in Asia. The persons by whose aid he was rapidly and quietly conveyed, in a carriage drawn by relays of horses, from Batavia to Fort Niagara, were said to have been freemasons. Prosecutions were in due time instituted against those whom the investigation showed to have been in any way concerned in the abduction, and repeated trials resulted in the conviction of some of them on minor charges, but no murder was ever judicially established. It was supposed to be shown in the course of these trials that the masonic oath disqualified masons in certain of the higher degrees for serving as jurors in any case where a brother mason of like degree was a party, and his antagonist was not. The anti-masonic party was thereupon formed in western New York, and polled 33,000 votes for its candidate for governor, Solomon Southwick, in 1828. This vote rose to 70,000 in 1829, and to 128,000 for Francis Granger for governor in 1830; in which aggregate, however, were included the suffrages of many who were not anti-masons. The excitement gradually diffused itself into other states, and in 1831 a national anti-masonic convention was held, wherein most of the free states were represented, and William Wirt of Maryland was nominated by it for president of the United States, with Amos Ellmaker of Pennsylvania for vice president. Mr. Granger was again the anti-masonic candidate for governor of New York in 1832, and received the votes of nearly all opposed to the reëlection of Gen. Jackson, but was defeated by about 12,000 majority. In Pennsylvania Joseph Ritner was this year brought forward as the anti-masonic candidate for governor, and beaten by barely 3,000 votes by Gov. Wolf, who had many enemies in his own party; but at the presidential election in the same year, Gen. Jackson carried the state over the combined opposition by 25,000 majority. Anti-masonic state and electoral tickets were supported in many if not most of the free states, but were successful only in Vermont, which cast her seven electoral votes for Wirt and Ellmaker. Vermont remained for two or three years under anti-masonic rule, but the party gradually faded out, and was absorbed by others during the political and financial struggle that grew out of Gen. Jackson's veto of the United States bank charter in 1832, and the removal of the deposits in 1833. Until then western New York, the theatre of the Morgan abduction and the cradle of the anti-masonic excitement, gave large anti-masonic majorities; while western Pennsylvania, northern Ohio, and portions of Massachusetts and Rhode Island, evinced a preponderating sympathy therewith. In 1835, during the struggle which followed the removal of the deposits, Joseph Ritner was chosen governor of Pennsylvania as an anti-mason, through a division in the democratic ranks; but the anti-masonic party gradually lost its distinctive character, and soon after ceased to exist.

ANTIMONY, a metal first extracted from the ore in 1490 by Basil Valentine, a monk of Erfurt. It is of a silver-white color, slightly bluish, of strong lustre, and of a peculiar taste and smell. Its texture is radiated and fibrous, and the metal is so brittle that it may be pounded to powder in a mortar. For this reason it cannot be used alone for any practical purpose, but combined with other metals it forms valuable alloys. Its specific gravity is 6·7, its melting point 842° F. At common temperature it does not oxidize, but heated moderately in the open air, it takes fire and burns with a bright bluish-white flame. The vapor is an oxide, which in condensing often forms beautiful crystals, formerly known as the argentine flowers of antimony. The metal also, after being melted in close crucibles and cooled very slowly, crystallizes in octahedral forms. The name is said to be derived from *anti-monachos*, or anti-monks, some preparation of the metal having proved fatal to several of the brotherhood, notwithstanding it had been observed that the same mixture had a fattening effect upon hogs, after purging them. A more probable derivation is from *atimad*, its Arabic name. The ancients gave the name *stibium* to some compound of the ore they were acquainted with, which was without doubt the common ore of commerce, the sulphuret. This name is adopted in chemical nomenclature to represent the metal. Its symbol is Sb. Antimony is sometimes found in a metallic state. It so occurs in the Hartz, in France, and in Sweden. The only important natural production of it, however, is the sulphuret, a combination of 71·77 per cent. of the metal and 28·23 of sulphur. This ore is of a lead-gray color, crystallized in laminæ and needles, which are very brittle and fusible in the flame of a candle. Its specific gravity is from 4·13 to 4·6; hardness=2. It is easily ground to a black powder, and in this state forms a pigment, which appears to have been used in ancient times by ladies for coloring the eyebrows and edges of the eyelids. The ore is not of rare occurrence in metalliferous districts; but the great supply of it is from the island of Borneo, through Singapore. There are mines of it in lower Hungary, France, and Great Britain. A large vein has been found in Tularé county, California, about 80 miles from Los Angeles, in a high granitic range that borders the Tularé valley on the south. Its separation from the sulphuret is now effected by first melting the ore in crucibles, perforated at the bottom, and placed in other vessels. As the ore melts, it flows through into the lower vessel, unaltered in composition, but freed from its earthy gangues. This is the crude antimony of commerce. On roasting it to expel the sulphur, different combinations of oxide of antimony and sulphur are formed—as the glass of antimony, the liver of antimony, and crocus. The first-named consists of 8 parts of oxide and 1 of sulphuret. It is a transparent salt, of a reddish yellow color. Crocus contains 2 parts of sulphuret to 8 of the oxide; it is opaque and of yellow-red color. Liver of antimony is opaque and deep brown; it consists of about 4 parts of sulphuret and 8 of oxide.—Crude antimony is reduced to a metallic state by first carefully roasting it to obtain the oxide. This is then mixed with crude tartar, or with carbonate of soda, and powdered charcoal, placed in melting pots, and heated in a wind furnace. An impure metal is thus obtained, called the regulus of antimony. This is again melted with a small proportion of oxide of antimony, by which it is freed from its impurities. Antimony combines with oxygen in three proportions, the first forming the peroxide, Sb_2O_3; the third quinquioxide, or antimonic acid; and the second antimoniate of antimony, or quadroxide, a compound of the other two.—The most important alloys of antimony are: type metal, consisting of 4 parts lead and 1 of antimony, which when used for stereotyping has added to it $\frac{1}{18}$ to $\frac{1}{50}$ of tin; Britannia metal, 100 parts tin, 8 antimony, 2 bismuth, 2 copper; and various white alloys used for teapots, spoons, and forks. Pewter may be made of 12 parts tin, 1 part antimony, and a little copper.—Several compounds of antimony are used in medicine. The *pulvis antimonialis*, corresponding to the nostrum James's powder, is composed of 1 part teroxide of antimony and 2 parts precipitated phosphate of lime. Kermes mineral is a compound of teroxide and tersulphide in varying proportion, and the precipitated sulphide contains also a portion of teroxide. The most important preparation is the tartrate of antimony and potassa, or tartar emetic. This drug causes vomiting by a specific effect upon the nervous centres. It has a peculiar depressing effect upon the heart and muscular system, both when it produces vomiting and when tolerance, as it is called, has been established. In poisonous doses it produces burning in the mouth, throat, and stomach, hiccough, copious secretion of mucus and saliva, colic and diarrhœa, muscular weakness, sometimes convulsions and cramp, and a pulse at first weak and slow, then weak and rapid. In chronic poisoning the symptoms are similar, but less marked. Frequently repeated, with intervals of comparative ease, they lead to emaciation, loss of strength, and finally fatal depression. The post-mortem appearances are not very characteristic, and for medico-legal purposes the presence of the drug must be demonstrated.—There are various processes for extracting antimony from suspected matter, which consist essentially in oxidizing and dissolving it in acids. Its presence may be demonstrated by the formation of characteristic precipitates, or by its deposit in a metallic form by Marsh's or Reinsch's test. The metallic spot formed by antimony in Marsh's test is less volatile than that of arsenic, and is insoluble in hot nitric acid or hypochlorite of soda, both of which dissolve arsenic. Tartar emetic is much less used in medicine than formerly, but still finds some favor as a diaphoretic and expectorant, and as a cardiac sedative in inflammatory diseases, especially pneumonia. Statistics, however, do not speak in its favor as compared with less depressing agents. In most cases other substances possess advantages over this drug as an emetic. Externally, in the form of ointment, it produces a pustular eruption. In poisoning by tartar emetic, vomiting should be encouraged by tickling the fauces and drinking warm water, or the stomach pump may be used. Tannin, such as exists in galls or in green tea, renders less active any of the drug which may remain in the stomach. Subsequent inflammation is to be treated on general principles.

ANTINOMIANS (Gr. ἀντί, against, and νόμος, law), those who reject the moral law as not binding upon Christians. Some go further and affirm that a child of God cannot sin; that the moral law is abrogated as a rule of life; and that good works hinder salvation. Wesley defines antinomianism to be "the doctrine which makes void the law through faith." Antinomianism in a modified form early showed itself in the Christian church, as appears by the Epistle of James, and later in the writings of Augustine, by whom it was opposed. Its full development is due to John Agricola (1492–1566), one of the early coadjutors of Luther. He maintained that the moral law was superseded by the gospel; that the law is binding only upon unbelievers, but as soon as a man exercises faith in Christ, he comes under a new moral economy with which the law has no possible relations; that the law is not in any way instrumental in bringing men to the benefits of the new dispensation, but that faith and repentance are to be secured only by the preaching of the gospel. He affirmed that these conclusions followed as necessary consequences from the doctrines taught by Luther, and that he and Melanchthon were inconsistent in not admitting them. The controversy between Luther and Agricola became violent. It was partially reconciled at a conference at Torgau (1527), when after a sharp debate Agricola retracted his doctrines; but, according to Melanchthon, "he was not convinced, but overborne." In 1537 Agricola, being then established at Wittenberg, put forth anonymously a series of theses on the nature of repentance and its relations to faith, in which his former views were more strongly expressed: "Art thou steeped in sin, an adulterer or a thief, if thou believest, thou art in salvation. All who follow Moses must go to the devil: to the gallows with Moses." Luther replied in a series of disputations, in which Agricola, who had in the mean time acknowledged the authorship of the theses, was at first treated tenderly; but afterward Luther used harsh language, classing Agricola with the Anabaptist fanatics. In 1540 Agricola again retracted, and was reconciled with Luther. The controversy was however carried on by others in Germany.—Antinomianism appeared in England during the protectorate of Cromwell, some of the sectaries maintaining that "as the elect cannot fall from grace nor forfeit the divine favor, any wicked actions which they may commit are not really sinful; and that, consequently, they have no need to confess their sins or to break them off by repentance." In the 17th century antinomianism again made its appearance in England, its supporters maintaining that it was a logical consequence from the doctrines taught by Calvin. It reappeared in the 18th century to a considerable extent among the followers of Wesley. It was earnestly opposed by Wesley and John Fletcher, the latter of whom wrote "Checks to Antinomianism," probably the ablest of his works. In America antinomianism properly so called has never been maintained except by isolated individuals, although it is sometimes used by polemics as a term of reproach. Among the prominent writers in English who have opposed antinomianism are John Wesley, John Fletcher, Robert Hall, and Andrew Fuller.

ANTINOUS, a beautiful Bithynian youth, the favorite of the emperor Hadrian, accompanied that prince on his journey through Egypt, and was drowned in the Nile A. D. 132. According to Dion Cassius, he drowned himself under the following circumstances: The oracle at Besa had informed the emperor that a great danger which was threatening him could only be averted by the immolation of the person whom he loved most fondly. The youth, hearing this, threw himself into the Nile as a voluntary sacrifice. To perpetuate his memory, Hadrian built near Besa the magnificent city of Antinoöpolis or Antinoë in Middle Egypt, and caused a newly observed star to be called by his name. Antinous was deified, mysteries in his honor were celebrated at Mantinea, and statues of him erected throughout the Roman world.

ANTIOCH (anc. *Antiochia;* Turk. *Antakia* or *Antakieh*), a city of Syria, was the most magnificent of 16 cities of the same name built by Seleucus Nicator, about 300 B. C., in memory of his father Antiochus. It was distinguished by the appellation Epidaphnes, which it received from the neighboring grove of Daphne, containing a magnificent temple of Apollo. (See DAPHNE.) Antioch was advantageously situated, in communication with all the trade of the Mediterranean, and conveniently approached by caravans from the east. It was the flourishing capital of the Seleucid empire, and subsequently the favorite residence of wealthy Romans. In the time of Chrysostom its free population was computed at 200,000, and the Christian church, which had been established here soon after the martyrdom of Stephen, then numbered 100,000. The inhabitants were distinguished both for their intellectual and their luxurious character. A high Greek civilization was mingled with various Asiatic elements; a passionate love of frivolous amusements was closely associated with a strong tendency to metaphysics and a solemn faith in astrology. To their addiction to scurrilous wit and the invention of nicknames may be attributed the appellation "Christians" first given in this city to the followers of Jesus Christ. For 600 years Antioch deserved the title which Pliny gave it of "queen of the East." About 145 B. C. tens of thousands of the inhabitants, who had revolted against Demetrius II. and besieged him in his palace, perished in a bloody struggle with the Jewish force sent for his rescue by Jonathan, one of the Maccabees. In A. D. 115 Antioch was almost utterly ruined by an earthquake, but was rebuilt in its ancient splendor by the contributions and influence of the emperor Trajan. In 155 it was destroyed by fire, and restored by Antoninus Pius. On the decline of the Roman empire it suffered severely in the wars with Persia, being sacked by Sapor I., Chosroës I., and Chosroës II. In 331 it was visited by a famine so dreadful that a bushel of wheat sold for 400 pieces of silver. The same calamity befell the city in the reign of Julian, and again in that of Theodosius. The inhabitants were severely punished by Theodosius in 387 for resisting the payment of an extraordinary tribute. In the years 458, 526, and 587 Antioch was visited by earthquakes, and on each occasion nearly ruined. That of 526 was the most destructive of life of any on record. Gibbon states that 250,000 persons perished. In 638 it fell into the hands of the Saracens, about 975 was reannexed to the Byzantine empire, in 1098 was taken by the crusaders, and in 1268 its power was extinguished by Sultan Bibars. (See BOHEMOND.) The bishop of Antioch in the 5th century received the title of patriarch, and ranked next to the bishops of Rome, Constantinople, and Alexandria. In the Greek church he still ranks immediately after the patriarchs of Constantinople and Alexandria. In the Roman Catholic church four bishops bear the title of patriarch of Antioch, those of the Maronite, United Greek, United Syrian, and Latin rites. None of the present patriarchs of Antioch reside in Antakieh.—Antakieh, or modern Antioch, is situated on the S. bank of the Orontes, which at this place is about 120 feet wide, 55 m. W. of Aleppo; pop. about 12,000. S. of the city is a high mountain, the sides of which Ibrahim Pasha fortified to command the town. It has a number of insignificant mosques with low minarets, and several Christian churches. Most of the Christians in Antioch and the neighboring mountains are Armenians, among whom the American missionaries have made many converts. Silk is much cultivated here, and exported in a raw state to France. Oil, soap, and leather are also manufactured, and grain, honey, and butter are exported in large quantities. The fertile plains of Antioch are quite uncultivated, being subject to raids by the Turcoman robbers, who are more dreaded by the peasantry than the Bedouins; but on the hills around are numerous plantations of figs, olives, and vines. Large herds of horses in a half wild state roam the plains; they are reared by the Turcomans for the Syrian markets. In 1822 the town again suffered severely from an earthquake; and on April 3 and 10, 1872, heavy shocks occurred, overthrowing part of the walls, rending the ancient Roman bridge in several places, and destroying a great number of the houses in the city and in the surrounding villages and several thousand lives.

City of Antioch.

ANTIOCH COLLEGE, a seat of learning at Yellow Springs, Green county, Ohio, 75 m. N. E. of Cincinnati. It was incorporated in 1852, and its buildings, erected at an expense of $150,000, occupy a beautiful and healthful situation. The college is designed to give education as cheaply as possible to the people of the West; to open every opportunity equally to men and women; and to be religious but not sectarian. It requires sound moral character in the students, not less than scholarship. Horace Mann was its president from 1853 till his death in 1859, when he was succeeded by Thomas Hill, D. D., who held the position until elected president of Harvard college in 1862.

In 1866 George W. Hosmer, D. D., of Buffalo, N. Y., was chosen president, but resigned the office in 1872, and was succeeded by Prof. Edward Orton. The education of the two sexes together has proved successful. About one third of the pupils have been women, and the moral tone of the students has been excellent. The average number in attendance in all departments for the last five years has been about 165. The highest cost of tuition in the college course is $30 a year. There are seven professors and four assistant female teachers. The college has an endowment of $103,000. By a recent vote of the board of trustees, an offer is made to the high schools of Ohio of free tuition to one young man and one young woman in each school yearly, who shall be well prepared to enter the freshman class. A preparatory school and a musical institute are attached to the college, and under the supervision of the faculty.

ANTIOCHUS, the name of several kings of Syria, of whom the following are the most important in its history: **I. Antiochus I., Soter,** born about 325 B. C., died in 261. He was the son of Seleucus Nicator and Apama, the daughter of the Persian satrap Artabazus. At the battle of Ipsus he commanded the cavalry of his father, and was routed by Demetrius Poliorcetes. He fell ill through love for his stepmother Stratonice, and his father not only abandoned to him the object of his desire, but abdicated a portion of his dominions in his favor. He joined his father in his expeditions into the countries lying between the Indus and the Caspian. On the assassination of Seleucus in Thrace (280) he inherited all his dominions. In his reign a division of the Gauls, who had ravaged Macedonia, Hellas, and Thrace, penetrated into Asia Minor, and settled permanently in northern Phrygia, subsequently known as Galatia. Antiochus gained a brilliant victory over them in 275, from which he took his surname of Soter (Saviour). He disputed the throne of Macedon with Antigonus Gonatas, the son of Demetrius Poliorcetes; but the matter was arranged by Antigonus retaining the throne and marrying the daughter of Antiochus. After an unsuccessful war with Eumenes, king of Pergamus, he put to death his eldest son, Ptolemy, who had revolted against him. He was killed by a Gaul in a battle near Ephesus. **II. Antiochus III., the Great,** son of Seleucus Callinicus and Laodicea, born about 238 B. C., slain in 187. He succeeded his brother Seleucus Ceraunus at a time when his kingdom was in a disorganized condition. After reducing a revolt of the governors of Media and Persia, and of Artabazanes, governor of Atropatene, he was defeated by Ptolemy Philopator near Gaza (217) in an attempt to secure possession of Cœle-Syria and Palestine, but recovered his laurels by suppressing the rebellion of his cousin Achæus, whom he besieged in Sardis, captured by treachery, and put to death, thus reannexing a considerable portion of Asia Minor to the Syrian monarchy (214). In pursuance of his scheme of restoring his kingdom to the position it held at the death of its founder, Seleucus Nicator, he turned his arms against Parthia, and reduced Arsaces III. to vassalage. He was unsuccessful against Euthymedus, king of Bactria. Crossing the mountains of Paropamisus (Hindoo Koosh) into India, he made a treaty of alliance with the king of the Punjaub, and directed his march homeward through the provinces of Arachosia, Drangiana, and Carmania, and reëstablished the Syrian supremacy in those regions. For this seven years' expedition he received from his subjects the surname of the Great. Soon after his return to Antioch (205), Ptolemy Philopator died, and his son Ptolemy Epiphanes, then five years old, succeeded to the throne of Egypt. Antiochus thereupon entered into an alliance with Philip of Macedon to overrun and partition Egypt. He quickly gained possession of Palestine and Cœle-Syria, and after a great victory near Paneas was received by the Jews in Jerusalem with great enthusiasm. Learning the defeat of his ally Philip by the Romans at Cynoscephalæ in 197, he made peace with Ptolemy, proceeded with a fleet along the coast of Asia Minor, reducing many of the Greek cities there, crossed the Hellespont, and took possession of the Thracian Chersonese. The Roman senate sent an ambassador in 196 to demand that he should restore what he had taken from Philip and Ptolemy, whose guardianship the Roman people had just assumed. They also demanded immunity for their ally Attalus, king of Pergamus. Antiochus replied that as he did not seek to interfere with what the Romans did in Italy, they must not trouble him in Asia. In the following year (195) Hannibal, driven from Carthage, took refuge with Antiochus at Ephesus. Hannibal's advice was to carry the war immediately into Italy, but Antiochus did not move till 192. Then he crossed over into Greece at the invitation of the Ætolians, who were in arms against the Romans. He brought only 10,000 men with him, but was chosen commander-in-chief by the Ætolian assembly, and began by making Philip of Macedon his enemy instead of his friend. After capturing Eubœa, instead of pressing forward, he wasted his time in treating about the surrender of a number of little cities, fell in love with a Eubœan damsel and married her, and spent the winter at Chalcis in a round of dissipation, in which his army shared. The Roman consul Acilius Glabrio, with Cato for his legate, now advanced upon him. He made a stand at Thermopylæ, was entirely routed, and barely escaped with his new wife (191). The next year Lucius Cornelius Scipio took the conduct of the war, with his brother Africanus as his lieutenant. Disheartened and panic-struck by the defeat of his fleet, Antiochus withdrew his troops from Sestos and Abydos, and the other fortified maritime cities of Asiatic Greece, which might have held the Romans in check. Thus the latter had free passage into Asia. The two armies met at Magnesia near Mt. Sipylus; that of Antiochus numbered 70,000 men, that of the Romans 30,000. The Syrians were thoroughly defeated and cut to pieces, and Antiochus was compelled to submit to whatever terms the Romans chose to impose. These terms were to resign the provinces west of the Taurus, to pay a large sum for the expenses of the war, to deliver up to the Romans his elephants and ships of war, and to surrender Hannibal and the other anti-Roman refugees. Hannibal and another were allowed to save themselves by flight; the rest were given up together with hostages for the execution of the treaty. One of these hostages was Antiochus Epiphanes, the king's younger son. In collecting means to pay the indemnity, he plundered a wealthy temple in the province of Elymais, upon which the indignant people rose and massacred him and his attendants. **III. Antiochus IV., Epiphanes,** or the Illustrious, second son of the preceding, succeeded his elder brother Seleucus Philopator in 175 B. C., died in 164. He was kept as hostage at Rome until his brother sent his own son Demetrius to replace him. He recovered Cœle-Syria and Palestine in a single campaign (171), overran all Egypt except Alexandria, took captive the young king, Ptolemy Philometor, and in 170 sacked Jerusalem and plundered the temple, as related in the book of the Maccabees. He undertook four expeditions into Egypt, and would have annexed that country had not the Roman ambassadors met him on the last occasion (168) and ordered its immediate evacuation. On his return home he commenced that great persecution of the Jews which is related in the 2d book of the Maccabees, during which time the service of the temple was broken off for three years. He set up the statue of Jupiter Olympus there, and desired to introduce the worship of the Greek deities, but was thwarted by the insurrection of Mattathias and his sons the Maccabees. After a frustrated attempt to plunder a temple in Elymais, he became raving mad, in which condition he died. His subjects called him, in parody on his surname, Epimanes, the madman.

ANTIOQUIA, one of the nine states of the United States of Colombia, between lat. 5° 3′ and 8° 9′ N., and lon. 74° 3′ and 76° 13′ W., touching the gulf of Darien on the N. W., and bounded by the states of Bolivar, Santander, Cundinamarca, Tolima, and Cauca; area, 24,823 sq. m.; pop. in 1870, 365,974, about 20 per cent. white, the remainder mestizos (mixed white and Indian), mulattoes, and Indians, chiefly civilized. The central range of the Andes spreads out over nearly the whole state, terminating in its E. and N. E. portions. The river Cauca flows through its entire length, and the Magdalena forms the E. boundary, and is navigable for steamers of light draught. Antioquia is rich in gold, and although the mines and washings are but little worked, the annual produce is estimated at $2,500,000. The soil is extremely fertile, and the valleys lying between the various mountain ranges abound in cattle. Springs impregnated with iodine abound throughout the state, to which is attributed the exemption of the inhabitants from goitre, which prevails in other parts of the republic. The principal cities are Medellin, the capital, Cáceres, Remedios, and Zaragoza.

ANTIPAROS (anc. *Oliarus* or *Olearus*), an island of the Grecian archipelago, one of the Cyclades, forming part of the eparchy of Naxos, Greece, about 8 by 7 m., separated from Paros by a strait 1½ m. wide; pop. about 1,000. Cotton, barley, and wine are produced in small quantities. The island contains masses of white marble, and is celebrated for a grotto, 120 yards long, 113 wide, and 60 feet high, situated 2 m. from the sea, at an elevation of 500 feet. It consists of an immense marble arch, the roof, sides, and centre of which are covered with stalactites and dazzling crystallizations assuming the shapes of columns, screens, flowers, trees, &c. The stalactites hanging from the roof unite in several places with stalagmites rising from the floor, so that the arch is apparently supported by a continuous series of pillars. The grotto is entered by a natural arch of rugged rock, overhung with trailing plants.

ANTIPAS, Herod. See HEROD.

ANTIPATER, a Macedonian general, one of the successors of Alexander, born about 390 B. C., died in 319. He was educated by Aristotle. Appointed viceroy of Macedonia and Greece when Alexander made his expedition into Asia, he defeated the Spartans and slew their king Agis in 331. Alexander became distrustful of him, and ordered him to be superseded, but died before the change could be made. At the division of the empire, Antipater received Macedonia and Greece, and the guardianship of the future child of Alexander by Roxana. When the death of Alexander became known, the Athenians determined to strike again for liberty, and made an alliance with the Ætolians, Thessalians, and all the Greeks north of the isthmus except the Bœotians, and with the Peloponnesians who were not of the Lacedæmonian party. The allies, under the Athenian Leosthenes, were at first successful; but Antipater, having been reënforced, gave them battle in 322 at Crannon in Thessaly, and, though the victory was not complete, compelled them to sue separately for peace. The Athenians and Ætolians, deserted by their allies, were unable to continue the struggle. Antipater demanded the surrender of Demosthenes and Hyperides, the two democratic orators, put a Macedonian garrison in Munychia to act in concert with Phocion and the Athenian conservative party, broke up the democratic constitution of Athens, and left the government in the hands of about 9,000 citizens who were possessed of a property qualification, and were disposed to peace, banishing most of the other citizens to various parts. He drove the Ætolians into their mountains, and starved them into submission. After the death of Perdiccas (321), Antipater made a new division of the provinces, giving a part of the territory of Perdiccas to Antigonus, part to Lysimachus, and part to Seleucus.

ANTIPHON, an Athenian orator, son of Sophilus the sophist, born at Rhamnus in Attica about 480 B. C., died in 411. He taught rhetoric at Athens, composed orations for others, was the first who received money for such services, and is believed to be the first who subjected the art of oratory to strict theoretical rules. He was the most active leader in the revolution which established the oligarchy of the 400 in 411; and his only public speech was the one he delivered in his own defence on its overthrow in the same year. Thucydides called it the ablest that was ever made in similar circumstances, but it is now lost. Antiphon was condemned to death. There are 15 of his orations extant, the best edition of which is that of Dobson (London, 1828).

ANTIPHONY (Gr. *ἀντιφωνία*, response), the response which, in the Roman Catholic service, one side of the choir makes to the other in the chant. Antiphonal or responsive singing is the most ancient form of church music, and is said by the historian Socrates to have been first introduced among the Greeks by Ignatius, and among the Latins by St. Ambrose. The chanting of the psalms alternately is doubtless older than Christianity, and prevailed in the temple service of the Jews, many of the psalms being composed in alternate verses as if with a view to this mode of singing. In the cathedral worship of the Catholic church, two full choirs are stationed one on each side of the sanctuary, one of which, having chanted a verse, remains silent, while the opposite choir replies in the verse succeeding; and at the end of each psalm the *Gloria Patri* is sung by the united choirs in chorus.

ANTI-RENTISM. The Dutch West India company authorized its members in New York to take up land upon the banks of the streams and rivers, on condition of introducing within a limited time 50 settlers for every mile of land. The proprietor was invested with the title and privileges of a lord patroon or protector, and his colony or manor was governed by the same customs and laws as were the feudal manors of the United Provinces. After the revolution a very large proportion of the land in the settled parts of New York was held by the patroons, and the cultivators occupied their farms on leases for one or more lives, or from year to year, stipulating for the payment of rents, dues, and services, copied from the feudal tenures of England and Holland. In 1779 and 1785 laws were enacted by the legislature of the state abolishing feudal tenures, but the proprietors of manor grants, unwilling to give up all their feudal claims, contrived a form of deed by which the grantees covenanted to perform services, and pay rents and dues, precisely similar to the feudal incidents thus abolished. The counties of Albany, Rensselaer, Columbia, Greene, Ulster, Delaware, Schoharie, Montgomery, Herkimer, Otsego, and Oneida include within their limits most of these manors. In 1839 associations were formed to devise means for getting rid of these burdens, and soon became known as anti-rent associations. The anti-rent feeling manifested itself in open resistance to the service of legal process for the collection of manorial rents. The first conflict which awakened general attention happened in the town of Grafton, Rensselaer county, where a band of anti-renters in disguise killed a man named Smith during an altercation on the highway. A legal investigation, at which more than 200 persons were from time to time examined, failed to disclose the author of the deed. In his messages of 1841 and 1842, Gov. Seward discussed the grievances complained of by the tenants. He recommended a reference of the matters in dispute to arbitrators, and appointed three men to investigate and report to the legislature. This commission failed to accomplish anything. The disaffection and excitement increased, until, after a tragical affair at Andes in Delaware county in 1845, Gov. Wright issued a proclamation, declaring the county in a state of insurrection. The trials and convictions at Delhi in that county, and the convictions of certain anti-renters at Hudson, Columbia county, for conspiracy and resistance to law, put an end to operations by the disguised bands. The anti-rent associations determined to form a political party, whose policy should be to elect all town and county officers from their own ranks, and to vote for no state, civil, judicial, or executive officers unfriendly to them, or unpledged to their cause. In the legislatures of 1842–'7 about one eighth of the members were elected in the interest of the anti-renters. In the constitutional convention of 1846 some of the ablest men were avowedly anti-renters, or advocates of their measures and principles. Their influence procured the insertion of a clause in the new constitution abolishing all feudal tenures and incidents, and forbidding the leasing of agricultural land for a term exceeding 12 years. The legislature at successive sessions passed laws which bore heavily upon the landlord interest, and tended gradually to ameliorate the condition of the tenants. In 1846 Gov. Wright, who was a candidate for reëlection, was defeated by 10,000 majority for John Young, whom the anti-renters had nominated. Gov. Young pardoned from the state prison all the so-called anti-rent convicts, on the ground that their offences were rather political than criminal, and that it was the wise policy of all good governments to forgive and restore to citizenship political offenders, after the law had been vindicated and order and peace restored. After 1847 the excitement died out, the anti-rent influence ceased to be a disturbing force in politics, and the anti-rent organization contented itself with efforts to contest in the courts the validity of the titles of the landlords, and the legality of the conditions and covenants contained in the manor grants.

ANTISANA, a volcanic mountain of Ecuador, in the eastern Cordillera, 35 m. S. E. of Quito, according to Humboldt, 19,148 ft. high; according to Wisse, 19,279. An eruption in 1590 is recorded; and Humboldt saw smoke issuing from several openings in 1802. Four immense lava streams descend from the snowy summit, one of which, the Volcan de Ansango, is 10 m. long and 500 ft. deep. The lava is mainly a black, cellular, trachytic porphyry. But the volcano is now dormant, if not extinct. On its side is Lake Mica, near which is the celebrated Hacienda, one of the highest habitations in the world and the centre of an extensive corral. Humboldt made its altitude 13,465 feet; Boussingault, 13,356; Orton, 13,300.

ANTI-SCORBUTICS. See SCURVY.

ANTISEPTICS (Gr. ἀντί, against, and σηπτός, putrid), substances or means which prevent or arrest putrefaction. Putrefaction is a process which highly complex organic bodies undergo when subjected to the proper conditions of heat, moisture, and air, and no longer controlled by the laws of vital chemistry. Nitrogenous or albuminoid bodies are essential to this process, in which they play the double part of being themselves decomposed and, by an imperfectly understood action called catalysis, exciting allied changes in other bodies. The growth of living infusorial organisms holding a very low position in the scale of animal or vegetable life, called vibrios and bacteria, is a frequent if not invariable accompaniment of this process; but it is still a question how essential they are in its production. The methods of preventing organic decomposition depend upon the removal of some one or more of the conditions necessary for its accomplishment. The temperature may be above or below the limits at which putrefaction can go on. The preservative effect of cold, and especially of dry cold, is well known, and exemplified in the keeping of meat and fruit on ice or in ice houses. Animals have been found undecomposed in the ice of Siberia, which belong to extinct species and which must have been embalmed in ice for ages. A boiling temperature coagulates albumen, kills infusorial organisms, and temporarily arrests putrefaction, until the material receives a new ferment from without. The exclusion of air, as in the process of canning fruit and meat, renders the result more permanent. Many substances withdraw water from the tissues, and also from the infusorial organisms, thus causing them to shrivel up and lose their activity. Such are sugar, glycerine, alcohol, and many salts, as common salt, saltpetre (nitrate of potassa), and alum. Fruits are largely preserved in sugar; many medicinal fluid extracts may be made with glycerine; and anatomical specimens may be preserved almost indefinitely in glycerine or alcohol. Salt and saltpetre are of the highest value in the preservation of meat. If the water is simply driven off by the heat of the sun and atmosphere, meat may be kept unchanged for a long time in a dry climate. Several of the agencies first mentioned, such as boiling water, alcohol, and some salts, as well as corrosive sublimate, chloride of zinc (Burnett's disinfecting fluid), and tannin, act by coagulating and rendering chemically inert albuminous substances. Corrosive sublimate is used but little except for anatomical purposes. Chloride of zinc is an excellent disinfectant for ships, hospitals, dissecting rooms, and water closets, and is also used to preserve bodies for dissection. Tannin forms with the gelatine of the skin, in leather, one of the most enduring of organic compounds. Prof. Brunetti of Padua has used tannic acid very successfully in the preservation, as anatomical specimens, of various internal organs. Bodies have been found perfectly preserved in peat bogs, that must have been undergoing the tanning process for hundreds of years. Many of the most useful antiseptics act not only in one or more of the ways mentioned, but also either as poisons to the infusoria accompanying decomposition, or as opposing the catalytic action of ferments. Quinia, for instance, has been found to have both these properties in a high degree, killing infusoria immediately in the proportion of one part to 800, in some minutes at 1 to 2,000, in some hours at 1 to 20,000, and preventing or retarding the formation of carbonic acid from sugar, the reaction of emulsine upon amygdaline, and of ozone upon guaiacum. As a preservative against actual putrefaction, it was found, weight for weight, less efficient than corrosive sublimate. Carbolic acid, creasote, chloroform, and perhaps the volatile oils, act in this way. Carbolic acid has been largely used of late years as a surgical antiseptic dressing, in watery solution, 1 to 30; diluted with glycerine, with alcohol, with oil, as putty, or as plaster with shellac. The antiseptic treatment demands that all wounds should be carefully protected from the air by some of the forms of carbolic acid dressing just mentioned, even a finger used in examination or an amputating knife being dipped in carbolic acid oil, lest they should carry living germs to the wounded surface. The action of creasote finds useful application in the smoking of meat. Volatile oils and resins were probably the active agents in the ancient process of embalming. Chlorine, and sometimes iodine, act as disinfectants by withdrawing hydrogen from products of putrefaction, allowing the nascent oxygen and other remaining elements to form simpler and more stable combinations, and as antiseptics by poisoning infusoria or destroying the activity of ferments.

ANTISPASMODICS, the means of removing spasm. Spasm or cramp occurs in muscular structures, and is caused by irritation of the nerves. Spasm consists in an irregular and sometimes excessive action of a group of muscles, or a single muscle, or some particular fibres only of a muscle; and various names are applied to spasms of the different muscles or sets of muscles. The conditions giving rise to spasm are various, and affect one or more parts of the nervous circuit, which may be conceived to consist of an afferent or sensitive fibre conveying sensitive impressions to a nervous centre, the latter transforming them into motor impulses, which, passing out by an efferent or motor fibre to a muscle, stimulates it to contraction. When these contractions take place irregularly, or in a degree disproportionate to the stimuli giving rise to them, or when they arise from stimuli which should not normally occasion them, and more especially when they take place unconsciously or involuntarily, they become spasms. They often arise from organic disease of the nervous centres, as in inflammation of the brain or spinal cord, or their membranes, from tumors and hæmorrhages, as possibly in chorea or St. Vitus's dance. A poisoning of the centres by abnormal constituents of the blood, as in Bright's disease, also gives rise to them. The nervous centres, especially the spinal cord and medulla oblongata, and the sensitive nerves, may become too sensitive, as in tetanus or lockjaw, poisoning by strychnia, and epilepsy. Other forms of spasm are due to special local irritations, as colic to improper food, uterine colic to the introduction of fluids into the uterus for therapeutic purposes, asthma to certain states of the atmosphere, cramps of the feet and legs to cold or constrained positions. In treating these various affections, various drugs may be used, which so far deserve the name of antispasmodics. Heat often relieves many spasms, as colic, cramps of the legs and feet, and the general convulsions of children from intestinal irritation, and may be applied in the form of hot baths or hot fomentations. Abnormal excitability of the spinal cord and medulla oblongata is diminished by bromide of potassium, which does excellent service in epilepsy, and sometimes by belladonna. The newly discovered hydrate of chloral has also the same property. Opium relieves the intense pains of uterine or other colic, and relaxes spasmodically contracted intestinal or uterine fibres. Ether and chloroform, inhaled, not only diminish but nearly destroy the activity of the nervous centres; they control all the voluntary muscles, and are the most powerful antispasmodics which can be used in any form of spasmodic disease. Unfortunately, their effect is often temporary. It is possible that the *physostigma* (Calabar bean) and woorara (South American arrow poison) may be practically used in some convulsive diseases. In organic diseases of the brain and cord, the disease rather than the symptom deserves attention. The substances to which the name antispasmodics in the narrowest sense is applied are used either in the treatment of colic, of some children's diseases, in many hysterical affections, and some others. They are the "volatile oils," such as mint, lavender, &c., derived chiefly from the tribe of plants called *labiatæ;* cajeput oil, from the *myrtaceæ;* dill, anise, fennel, &c., from the *umbelliferæ*—from which tribe also are derived the fœtid gum resins, such as asafœtida, galbanum, ammoniac, &c. These, with valerian, myrrh, and camphor, derived from the vegetable kingdom; musk and castoreum, from the animal kingdom; cyanide of iron and the oxides of bismuth and zinc, from the mineral kingdom, are among the most valuable antispasmodics. In the treatment of hysteria, moral, tonic, hygienic, and sometimes surgical measures are of far greater importance than antispasmodics, which at the most can only temporarily relieve symptoms.—Spasmodic affections may be complicated with inflammation, and in that case they require most careful and somewhat different treatment. They may also occur in debilitated constitutions, or in persons of full habit; and here again the treatment differs. Thus the medicines classed under the head of antispasmodics are of small importance in comparison with a correct diagnosis and an appropriate mode of treatment in each special form of spasmodic affection.

ANTI-SLAVERY. See Slavery.

ANTISTHENES, an Athenian philosopher, the founder of the sect of the Cynics, flourished about 380 B. C. He was a pupil of Gorgias, and afterward one of the most faithful disciples of Socrates, remaining with him through all his sufferings, and being present at his death. He began to teach his new doctrines in the Cynosarges, a gymnasium near the temple of Hercules, set apart for the instruction of the sons of Athenians by foreign wives; Antisthenes himself was the son of an Athenian citizen and a Thracian (or according to some authorities a Phrygian) woman. From this gymnasium the followers who soon surrounded him probably took their name of Cynics. He taught that the highest virtue consisted in self-denial, independence of outward forms, social usages, and the comforts and luxuries of civilization, and in despising riches, honors, and human knowledge. His principal disciple was Diogenes. His works, of which only trifling fragments remain, were of a polemic character, bitterly assailing many of his contemporaries.

ANTITAURUS. See Taurus.

ANTITRINITARIANS. See Unitarianism.

ANTIUM, an ancient city of Latium, built on a rocky promontory which projects into the Mediterranean, 32 m. S. of Rome. One legend ascribed its foundation to a son of Ulysses and Circe, another to Ascanius. No authentic record shows even by what people it was founded. In the time of Tarquinius Superbus, who annexed it to the Latin league, it was inhabited by a mixed race who practised piracy and carried on a limited legitimate commerce. They favored the Volscians, and were only kept among the cities subject to Rome by strong garrisons and bodies of Roman colonists, who were sent to Antium from time to time. Later, though at exactly what period is not known, it fell entirely into the hands of the Volscians, and for some time vigorously aided them, according to Livy, in their wars against the Romans. In 468 B. C. it was retaken by the latter, and held till 459, when it again revolted. For a century it was the chief Volscian city, but in 338 it was a third time overcome and garrisoned by Rome. The city continued prosperous, partly because of its excellent harbor, partly because of its popularity as a summer resort for the citizens of Rome. Caligula and Nero were born in Antium, and Cicero had a villa there. A vast circus, and temples of Venus, Æsculapius, Apollo, and Fortuna, as well as one which was the seat of a celebrated oracle, added to the magnificence of the city. Its prosperity declined with the decline of the western empire, and it was laid waste by the Saracens during their incursions, so that by A. D. 950 it had become a petty fishing village. Pope Innocent XII. (1691–1700) made an attempt to restore something of its beauty, but with only temporary success; and the town, known in modern times by the name of Porto d'Anzo, remained almost deserted until the accession of Pius IX. This pope built there a very beautiful church and a villa which was for many years his favorite summer residence. Other beautiful villas have sprung up around it, and Porto d'Anzo is now a town of about 1,000 inhabitants, occupying almost the centre of the site of ancient Antium, the ruins of which are everywhere visible. Among these ruins were found the Apollo Belvedere and the "Fighting Gladiator" of the Borghese collection, with other art treasures.

ANT LION, or **Lion Ant**, a species of neuropterous insect, of the genus *myrmeleon* (Linn.), which has become celebrated for the singular manner in which the larva obtains a living prey. The perfect insect (*M. formicarium*, Linn.) resembles a small dragon fly, has a good power of flight, and is generally found in the warmer parts of Europe. The larva is about half an inch long, of an oval depressed form, and grayish sandy color; the small head is armed with two strong and long mandibles, serrated and pointed, with which it seizes and sucks the juices of its prey. The powers of locomotion being small, it has recourse to artifice to entrap insects. It makes a funnel-shaped excavation in sandy soil, with loose and crumbling sides, and buries itself, all but the head, at the bottom, waiting for a victim. If an ant or small insect approaches the edge, the sand gives way and it rolls down within reach of the expectant jaws; after the body has been drained it is cast out by a toss of the head. If the insect be large or likely to escape, the ant lion throws repeated showers of sand upon it by means of the head, until it falls exhausted and defenceless to the bottom of the pitfall. Sometimes a revengeful wasp, well-armed bee, or mail-clad beetle falls into the snare, and the sting of the first two or the powerful jaws of the last often prove fatal to the ant lion. The larva state continues about two years, when a cocoon is spun, in which it is changed into an inactive nymph; the perfect insect comes out in two or three weeks, and lays the eggs for a new brood in dry and sandy places suited for the operations of the larvæ. There are other species both in the old world and the new, all with similar habits.

ANTOINE DE BOURBON, duke of Vendôme, and afterward king of Navarre, the father of Henry IV. of France, born in 1518, died Nov. 17, 1562. He married in 1548 Jeanne d'Albret, only child of Henry II., king of Navarre, and assumed the title of king in her right. Like his brother, the duke of Condé, he embraced Protestantism. After the accession to the throne of France of the young king Francis II. (1559), he endeavored to obtain the control of the affairs of that country, but failed through his want of energy and perseverance. On the death of Francis in 1560, he was made lieutenant general of the kingdom, and adviser to the queen mother (Catharine de' Medici), during the minority of Charles IX. He then abandoned his former associates and religion, and allied himself with the duke of Guise and the constable de Montmorency. Upon the breaking out of the civil war in 1562, he commanded the royal forces, and died of a wound received at the siege of Rouen.

ANTOMMARCHI, Carlo Francesco, physician to Napoleon at St. Helena, born in Corsica, died at San Antonio de Cuba, April 3, 1838. He was professor of anatomy at Florence, where in 1818 Letitia Bonaparte sent Cardinal Fesch to induce him to go to St. Helena. The emperor at first treated him with marked coldness, but afterward honored him with implicit confidence, and in his will left him 100,000 francs. On the emperor's death Antommarchi went to Paris, where he published *Les derniers moments de Napoléon* (2 vols. 8vo, 1828). Nearly nine years after Napoleon's death Antommarchi produced a cast of his head, which purported to have been taken after death. The authenticity of this cast was hotly contested, especially by the advocates of phrenology, against whom it was used as an argument.

Antommarchi in consequence of these disputes came to America about 1836, and practised homœopathy at New Orleans and Havana.

ANTONELLI, Giacomo, an Italian cardinal and statesman, born at Sonnino, near Terracina, April 2, 1806, died in Rome, Nov. 7, 1876. He was educated at the great seminary of Rome, and having early distinguished himself by his ability and energy, he was appointed by Gregory XVI. to various civil offices, attaining in 1845 to the post of minister of finance. After the accession of Pius IX. he was made cardinal (June 12, 1847), and in 1848 prime minister, in which position he won at first the favor of the popular party. Though continuing to be the pope's chief political adviser, the opponents of innovations soon compelled him to make place for Mamiani. After the assassination of the latter's successor, Rossi, Antonelli urged Pius IX. to leave Rome, and joined him at Gaeta (November, 1848), where he conducted the negotiations which resulted in the pope's return to his capital (April 12, 1850) under the protection of the French army of occupation. Antonelli was now made secretary of foreign affairs, in which capacity his retrogressive policy exasperated the liberals, and even led to remonstrances on the part of foreign powers, but without shaking his position. He protested in vain against the progress of events in Italy, reorganized the civil administration on the most reactionary basis, and was opposed in his absolute policy even by some of his colleagues in the papal government, the principal of whom, Mgr. de Merode, minister of war, was removed in 1865. In 1867 he was made *curator ad interim* of the university of Rome. In January, 1868, by the death of Cardinal Ugolino, he became dean of the order of cardinal deacons. After the evacuation of Rome by the French in August, 1870, he appealed to various foreign powers for assistance, and remonstrated against the success of Victor Emanuel, who made his formal entry into Rome Nov. 21, 1871. An attempt upon his life was made in 1855.

ANTONELLO DA MESSINA, an Italian painter, born at Messina in 1414, died about 1493. According to Vasari and other authorities, he was the first Italian who painted in oil, learning the art under Van Eyck at Bruges. Before his journey to Bruges, he had already acquired some fame at Messina, Rome, and Palermo, which became more firmly established on his return, when he worked for some time at Milan and at Venice to some extent in portrait painting, but chiefly in religious pictures.

ANTONINUS, Marcus Aurelius, a Roman emperor, son-in-law and successor of Antoninus Pius, born A. D. 121, ascended the throne in 161, died March 17, 180. His original name was Marcus Annius Verus. After the death of Ceionius Commodus, better known as Verus, Hadrian selected Antoninus Pius to succeed him, and caused the latter in his turn to adopt Marcus Annius and Lucius Verus, the son of Commodus, as his ultimate successors. During the reign of Antoninus Pius, who had given to him his daughter Faustina in marriage, Marcus distinguished himself principally by his studies in philosophy, having assumed the mantle of the Stoics in his 12th year; while Verus so far disgraced himself by his early profligacy, that his adoptive father disinherited him, and, procuring the nomination of Marcus Aurelius as sole successor by the senate, associated him with himself in the empire. On his accession, however, Marcus Aurelius, who now assumed the name of Antoninus, gave Verus an equal share of the government. Shortly after his accession a war broke out with the Parthians in the east, the command of which, nominally given to Verus, was virtually held by his lieutenants, the principal of whom, Avidius Cassius, overran Mesopotamia, destroyed Seleucia, and penetrated as far as Babylon, while one of his colleagues made himself master of Armenia, replaced the rightful king of the Parthians, Sozimus, on the throne, and reduced Vologeses, his rival and the instigator of the war, to sue for a dishonorable peace. This outbreak was followed, or rather interrupted, by yet more dangerous hostilities in the north, extending from the sources of the Danube to the Illyrian frontier, where the barbarous tribes of the Marcomanni, Alani, Jazyges, Quadi, Sarmatians, and others, all took arms at once in such force as compelled both the emperors to proceed to the frontiers. Here they were so successful, that in 169 the enemy sued for peace, and the colleagues set out on their return for home; but Verus dying of apoplexy on their journey, and the war being renewed, Marcus Aurelius again turned his face northward, and for the next five years carried on the war in person in Pannonia, without ever returning to Rome; enduring the greatest hardships with the serenity of a philosopher, while he conducted his campaigns with the skill of a soldier. On one occasion a fierce battle was fought on the surface of the frozen Danube; but the most remarkable victory was one gained over the Quadi in consequence of a sudden and terrific thunder storm, by which the Romans were saved from apparently imminent defeat, and the superstitious savages were confounded and put to rout. This victory was generally ascribed to divine interposition, the emperor and his Romans attributing it to Jupiter Tonans, and the Christians, who composed the 12th or Meletine legion, to the influence of their prayers. Eusebius goes so far as to assert that the emperor gave to that body of men the title of the "thundering legion;" but in spite of his virtues, Marcus Aurelius persecuted the Christians. His wife Faustina, learning the danger of her husband's situation, and fearing that in case of his death, and the long minority of her young son Commodus, she should sink into a private station, entered into an intrigue with Avidius Cassius, the emperor's deputy and general in Syria, promising him her hand in case of the death of Aurelius, and encouraging him in that event to seize the reins of the government. A false report of the defeat and death of Aurelius following, Avidius Cassius assumed the purple. Despairing of pardon when he learned the falsity of the report, he persisted in his rebellion, and rapidly made himself master of several Roman provinces in Asia. While the emperor was making preparations to reduce him, the usurper was assassinated by a centurion of his own army. The conduct of Marcus Aurelius was magnanimous in the extreme. He put no one to death in consequence of the overt treason, punished but few, and burned the letters of Cassius, in order to avoid learning who had seconded or instigated him in his proceedings. Faustina, who had remained in her husband's company during these compromising events, and whose privity he either did not suspect, or, more probably, did not choose to perceive, died in Cilicia, it was supposed by suicide. In 176 the emperor visited Rome after an absence of eight years, and celebrated his victories by a splendid triumph, and by a largess to every Roman citizen of eight pieces of gold; then having associated with himself in the sovereignty his unworthy son Commodus, and celebrated the young man's nuptials with Crispina, he marched in company with his expectant successor to conclude the war with the northern barbarians, and, in the midst of a career of uninterrupted triumph, died at Vindobona, now Vienna. Commodus was suspected of hastening his end. Marcus Aurelius was an excellent man and an admirable monarch. His whole life was a practical example of his own philosophic doctrines. The only blot on his character was a cruel persecution of the Christians in Gaul; and this is so inconsistent with the spirit of his own character, with his general principles of mildness and toleration, and with the example of his predecessor, by which he was for the most part strongly influenced, that it is difficult to explain. His "Meditations," which are still extant, would be an honor to any writer of any age, and breathe the very spirit of the religion which he persecuted. The best edition is Gataker's (4to, Cambridge, 1652). The best English translation is that of George Long, "Thoughts of the Emperor Marcus Aurelius Antoninus."

ANTONINUS PIUS, Titus Aurelius Fulvius, a Roman emperor, born near Rome, Sept. 19, A. D. 86, began to reign in 138, died in 161. He was descended from a respectable provincial family of Nemausus (Nîmes) in Gaul. He rose during the reign of Hadrian to the administration of Asia, and afterward to the management of one of the four regions of Italy, and was selected by Hadrian as his successor, wholly on account of his fitness for the dangerous eminence. His reign was eminently happy and prosperous, and so peaceful that it passed away leaving no striking mark upon the page of history. He made no effort to advance the limits of the empire, but by his firmness and wisdom deterred the barbarians on his frontiers from disturbing the peace of the realm. The Germans, the Dacians, the Mauritanians, the Greeks, the Egyptians, all exhibited at times some tendency to give trouble; but their aggressions were easily frustrated by military demonstrations. The only commotion of any real consequence was that of the Brigantes in the northern part of Yorkshire, who repeatedly invaded the central parts of the British province, but were severely defeated by the legate Lollius Urbicus (141), who built a strong rampart of turf and stone, the ruins of which can be still traced, and are to this day known as the wall of Antoninus, from the mouth of the Esk to that of the Tweed, some distance to the north of that of Hadrian, which had been erected to prevent the incursions of the Caledonians, from the mouth of the Tyne to that of the Solway. The Parthians gave up their hostile views against Armenia, owing solely to his remonstrances; the Scythians submitted their disputes to his arbitration; and the barbarians on the upper Danube received a king of his appointment. At home he promoted literature and education, and made up for the losses of citizens through public calamities out of his private purse. He was fond of country life, and passed much of his time at his Campanian villas, never after his accession appearing at the head of his armies, and refusing to travel in his provinces, in order that they might not be subjected to the expenses of a royal progress. He died in the 75th year of his age. His reign of peace and order, and his observance of religious rites, procured for him the title of the second Numa, while he owed his surname Pius to the zeal with which he advocated in the senate the granting of divine honors to his paternal predecessor. He tolerated and protected the Christians, and received with favor the first apology for the Christian religion, addressed to him by Justin Martyr. By his wife Faustina he had two sons, both of whom died before their father, and two daughters. One of the latter, a second Faustina, inherited both the beauty and the profligacy of her mother; she was married to Marcus Aurelius Antoninus.

ANTONIO, Nicolas, a Spanish bibliographer of Flemish origin, born at Seville in 1617, died in Madrid in 1684. He lived in Rome 20 years (1659–'79) as agent of Philip IV. and in other official capacities, and collected a library there said to have been only second in importance to that of the Vatican. His fame rests on his *Bibliotheca Hispana Nova* and *Bibliotheca Hispana Vetus*, which comprehend all the literary names of Spain, and in some cases of Portugal, from the 1st century to nearly the end of the 17th. In many instances biographies are given of the various authors.

ANTONIUS, Marcus, a Roman orator, born in 143 B. C., killed in 87. In 104 he was prætor, in 99 consul, and in 97 censor. He was famed for his eloquence in the forum, rendering Italy, according to Cicero, the rival of Greece. As an aristocrat, he adopted the party of Sylla, and was put to death by Marius and Cinna when they triumphed. He is one of the interlocutors in Cicero's *De Oratore*. He was the grandfather of Mark Antony.

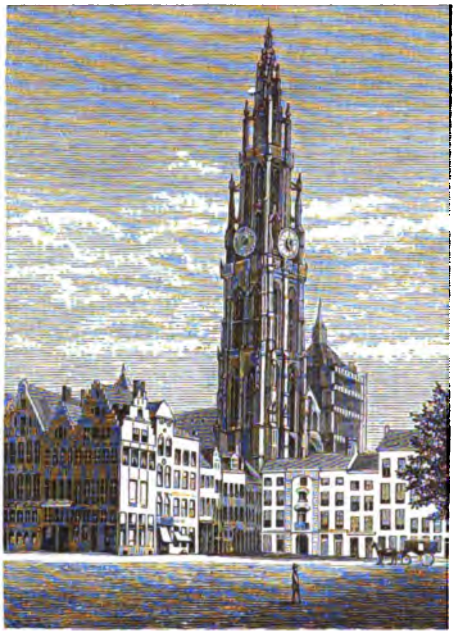
ANTONY, Mark (Marcus Antonius), the Roman triumvir, born in 83 B. C., died in 30. He was the son of Marcus Antonius Creticus and Julia, daughter of the former consul Lucius Julius Cæsar. During his boyhood, and while he was receiving a good education under his tutor Epidius, his father died, and his mother married Publius Lentulus, afterward strangled for his share in Catiline's conspiracy. In his stepfather's house he met the most profligate young men of Rome, and, sharing their habits of extravagance, he was obliged to take refuge from his creditors in Greece, where he completed his studies. After serving with much distinction under Gabinius in Syria (57), and in Egypt (56–55), and under Cæsar in Gaul, he returned to Rome, and was made a tribune of the people; but having strongly espoused the cause of Cæsar, and vetoed the senate's decree commanding that leader to disband the armies he had with him in Gaul, Antony was obliged to leave Rome in the disguise of a slave and take refuge in Cæsar's camp. He warmly seconded Cæsar in his subsequent subjection of Italy, and when his chief became dictator was appointed by him commander of the cavalry, and governor of Italy during the absence of the victorious leader, who was pursuing Pompey. During his governorship, Antony gave himself up to the most open licentiousness, repudiating his wife, appearing publicly in his chariot with a common courtesan, and surrounding himself with debauchees of every class. He subsequently married Fulvia, widow of Clodius. In 44 B. C. Cæsar appointed him his colleague in the government, and he in return aided his patron in many ways; once testing the popular feeling by publicly offering him an imperial crown on the occasion of the Lupercalia. On Cæsar's death, Antony at first feigned submission to the assassins; but afterward, seizing the opportunity given by their allowing him to deliver the funeral oration, he so eloquently incited the people to avenge the dictator's murder that the conspirators were driven from Rome. He was now the most powerful man in the state; but his plans for the dictatorship were checked by Cicero, who urged the claims of Octavius Cæsar; the surname Cæsar proved an excellent popular catchword, and Antony, opposing this new choice, was declared an enemy of the republic and banished from Rome, while the senate supported Octavius. After raising an army, fighting several battles, and suffering defeat at Mutina — from which place he was obliged to flee to his friend Lepidus, who was preserving an armed neutrality beyond the Alps—Antony finally effected a reconciliation with Octavius, with whom he at once joined in a scheme for the complete subjection of Rome. The triumvirate was formed soon after by Octavius, Antony, and Lepidus (43). In the general slaughter of their enemies which followed, Antony caused Cicero to be murdered among the first victims. Brutus and Cassius were speedily defeated at Philippi (42) by the army of the triumvirs, and the latter now divided the empire, Antony receiving Asia, Macedonia, Syria, and Greece. He next carried on a war against the Parthians, and, when finally obliged to retire from their country, effected one of the most skilful retreats recorded in history. While adjusting the affairs of his department of the empire, he met Cleopatra, queen of Egypt, and from that moment became the complete slave of her caprices, extending her dominions, ruling as she dictated, and deserting his wife (Octavia, the sister of Octavius, whom he had married after the death of Fulvia), to lead a life of unexampled luxury and sensuality with his new mistress at the Egyptian capital. The Romans were enraged. Octavius sent a fleet and army against him, and defeated him in the naval battle of Actium (31), partly through Antony's fatuity in following Cleopatra when she retired from the engagement, in which she at first acted as his ally. For a time he abandoned himself again to his old excesses. In a few months Octavius again completely defeated him in Egypt. His resources were now at an end, and, rendered desperate by his failure and by a false report that Cleopatra had committed suicide, he stabbed himself, and died in her presence, having been carried to her wounded as soon as he discovered that the report of her death was untrue.

ANTRAIGUES, Emmanuel Louis Henri de Launay, count d', a French adventurer and secret agent, born at Villeneuve-de-Berg about 1755, assassinated near London, July 22, 1812. He was a patron of science, letters, and art, figured conspicuously in aristocratic circles, where in 1788 he was called the handsome conspirator, and wrote against the nobility. After his election in 1789 as deputy to the states general he soon returned to royalist doctrines, and leaving France in 1790, was subsidized by foreign governments to intrigue against the revolution. His name became notorious in the conspiracies against Napoleon, who had him arrested in Italy in 1797, with documents incriminating Pichegru. He escaped, went to St. Petersburg, joined the orthodox Greek church, and received a pension and the office of chancellor of the Russian legation at Dresden (1803), whence he was expelled by order of Napoleon, against whom he had published a famous diatribe (*Fragment du* 18^{me} *livre de Polybe, trouvé sur le Mont Athos*). He next betrayed Russia by revealing to Canning the secret articles of the treaty of Tilsit, and received a large pension from the English government; but Napoleon's detectives having, as was supposed, received copies of these documents through his valet Lorenzo, the latter, fearing the consequences of his treachery, assassinated his master and his wife, and then shot himself.

ANTRIM. **I.** A county forming the N. E. extremity of Ireland, in the province of Ulster, bounded N. by the Atlantic ocean, E. by the North channel, S. by Belfast Lough and county Down, and W. by Lough Neagh and county Londonderry; area, 1,191 sq. m.; pop. in 1871, 419,782. The surface is hilly, and near the E. and N. E. coasts there are several considerable elevations, from which the country slopes gradually inland to the level of Lough Neagh. There are no considerable rivers except the Bann, which flows between this county and Londonderry. The seacoast is bold and rugged, formed of lofty basaltic cliffs, and presenting, between Bengore Head and the mouth of the Bann, the singular formation known as the Giant's Causeway. (See GIANT'S CAUSEWAY.) In the N. E. part of the county, called "the Glens," are picturesque and fertile valleys, and the scenery is varied and pleasing. Besides agriculture, the linen manufacture is the chief employment of the people; and along the coasts an extensive fishery is carried on. The principal towns are Belfast, the county town (a part of which, however, belongs to county Down), Antrim, Ballymena, Carrickfergus, Larne, and Lisburn. **II.** A market town of the preceding county, situated on the right bank of the Six-Mile Water, less than a mile from its embouchure into Lough Neagh, and 13 m. N. W. of Belfast; pop. in 1871, 2,131. It is a principal seat of the linen manufacture. The town is well built, and consists of little more than one long street, with its short cross streets. Near it are Antrim castle and Shane's castle, one of the celebrated round towers of Ireland. On June 7, 1798, a battle was fought here between the English troops and the United Irishmen, resulting in a victory for the former.

ANTRIM, a county of Michigan, in the N. W. of the main peninsula, bordering on Grand Traverse bay, Lake Michigan; area, 700 sq. m.; pop. in 1870, 1,985. There are several small lakes in the county. The productions in 1870 were 8,596 bushels of wheat, 10,605 of Indian corn, 4,270 of oats, 45,098 of potatoes, 22,920 lbs. of butter, and 16,268 of maple sugar. There were 12 school houses and 399 children attending school.

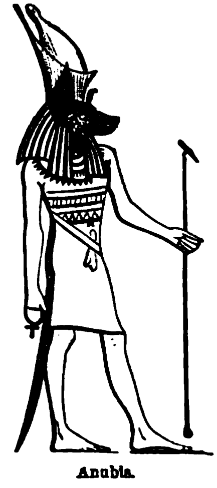
ANTWERP (Fr. *Anvers*; Span. *Ambéres*; Ger. and Flem. *Antwerpen*). **I.** A province of Belgium, bounded N. by Holland, and E., S., and W. by the Belgian provinces of Limburg, Brabant, and East Flanders; area, 1,094 sq. m.; pop. in 1869, 485,883, nearly all Roman Catholics. The province is almost an uninterrupted flat, but chiefly composed of fertile soil, excepting some barren districts in the N. and N. W. The district called the "polders," extending along the Scheldt from Antwerp to Zandvliet, originally a swamp, has been drained and converted into rich pasture and arable land. The principal rivers are the Scheldt, which borders it on the west, and its navigable tributaries, the Rupel, the Dyle, and the Great and Little Nèthe. The province is rich in wheat, rye, barley, flax, hemp, fruit, cattle, horses, fish, honey, and tobacco, and in manufactures of cotton, lace, woollens, linens, silks, soap, spirits, refined sugar, salt, leather, and oil. The principal towns are Antwerp, Mechlin, Lierre, Turnhout, Boom, Gheel, and Zandvliet. **II.** A city, capital of the preceding province, and the principal seaport of Belgium, situated on the right bank of the Scheldt, 45 m. from its mouth, and 29 m. by railway N. of Brussels, in lat. 51° 13′ N., lon. 4° 24′ E.; pop. in 1869, 126,668. The recent removal of the old fortifications has vastly extended the area of the city. The old citadel, long regarded as a model fortress, has been razed, and the greater part of its site was sold in 1870 to the Prussian railway contractor Strousberg for 14,000,000 francs, under the condition that about half of the space should be reserved for the construction of basins, docks, and wharfs. The rest of the ground is to serve as a site for a new railway station. A new city, with fine boulevards, squares, and promenades, has sprung up on the site of the old ramparts and bastions. The new fortifications, constructed in 1862–'5, extend over an area of nearly 20 m. The new citadel (*citadelle du nord*) commands the river and is connected with the principal old fort by a new curved line of walls. The outer circle of detached forts, each provided with about 135 guns, are linked together by a military road beyond the reach of shells from an enemy outside. About one half of the enceinte is defensible by inundations produced by cutting the dikes. The whole enceinte is expected to afford room for about 30,000 men in bombproof barracks. The cost of the new work is estimated at about 12,000,000 francs. Gun carriages and artillery appendages are made in the arsenal, and ammunition for ordnance and small arms in the pyrotechnic school. The magnificent dockyards constructed under the direction of Napoleon I. were demolished in 1814 in accordance with the treaty of Paris, but the two great basins were preserved and have been converted into docks, which are lined with warehouses. New dock basins (*Kattendyk*) were opened in 1860. An extensive system of canals affords facilities for inland traffic. The old part of the city retains its quaint Flemish characteristics. The Flemish language is spoken by the mass of the people and French by the cultivated classes. On the Place Verte is a conspicuous statue of Rubens, who lived and died here. Vandyke's is near the museum, and one of Teniers was erected in 1867. The cathedral of Antwerp, one of the most celebrated Gothic edifices of Europe, contains master works of Rubens and other celebrities. The churches of the Augustines, St. James, St. Anthony of Padua, and others, contain also remarkable paintings of the great masters. In the church of St. George, opened in 1853, are frescoes by Guffens and Sweerts. The works of Rubens



The Cathedral of Antwerp.

and Vandyke give the highest celebrity to the academy or museum of painting. The old bourse, which served as a model for the London exchange, was destroyed by fire in 1858. The new bourse is near the hôtel St. Antoine. The hôtel de ville contains fine paintings. Among the other public buildings are the library and the botanical and zoölogical gardens. The city is connected by railways with all parts of the continent, has regular steam communication with English, Dutch, and German ports, and is a point of departure for emigrants to the United States. In 1840 the tonnage was about 350,000; in 1856, 900,000; and in 1871, over 2,000,000. About 7,000 vessels annually enter and leave the port. The navigation and commerce of the United States with Antwerp for 1870 comprised 50 vessels entered and 48 cleared; the inward cargoes, chiefly guano and petroleum, were estimated at $4,528,693, and the outward at $2,046,147. The larger portion of the Belgian import and export trade, valued in the aggregate at 5,000,000,000 francs, passes through this port.—Antwerp was a place of importance as early as the 11th century, and was at the zenith of its prosperity in the 15th and 16th, with a population estimated as high as 200,000, and a commerce extending all over the world; and the Scheldt was filled with shipping of all nations, 2,500 vessels being there at one time. Philip II., to protect himself against the citizens, added in 1567 a citadel to the original fortifications of 1540. A conflict in 1576–'7 between the local, German, and Spanish troops, resulted in the death of 10,000 persons and in the surrender of the citadel by the citizens. In 1583 the latter defeated the attempted seizure of the city by the duke of Anjou. On Aug. 17, 1585, the citadel capitulated after 13 months' siege, one of the most eventful in history, to the duke of Parma, Spanish viceroy of the Netherlands. The prosperity of the place, shaken by these vicissitudes, was almost annihilated by the closing of the navigation of the Scheldt in the middle of the 17th century. Rotterdam and Amsterdam during this period superseded Antwerp in importance, and its commerce did not begin to revive till after the acknowledgment of the freedom of the Scheldt navigation by Holland in 1795. The citadel was captured in 1746 and 1792 by the French, in 1793 by the Austrians, and in 1794 once more by the French. In 1809 Bernadotte protected the city against Lord Chatham's attempt to destroy the port and the forts. In 1814 it was defended against the English by Carnot, the French governor, and surrendered only after the conclusion of peace, May 5. After the union of Belgium with Holland (1815) Antwerp carried on an extensive trade with Java, which has since been diverted to Dutch ports. In 1830, during the Belgian revolution, the city was bombarded from the citadel by the Dutch general Chassé, who was finally forced to surrender his stronghold Dec. 23, 1832, after a siege by a French army of 50,000 men under Marshal Gérard. This ended the contest with Holland, and on Dec. 30, 1832, the citadel, almost wholly destroyed by the bombardment, was occupied by the Belgian troops, since which period the city has become the great commercial emporium and military stronghold of Belgium. The abolition by settlement in 1863 of the Belgian Scheldt dues had a happy effect upon the prosperity of Antwerp. In September, 1871, a great part of the city was destroyed by fire, but rapidly rebuilt.—The remarkable former artistic achievements of Antwerp are described in Schnaase's *Niederländische Briefe* (Stuttgart, 1834); and among the more recent historical works relating to the city is *L'Histoire de la ville d'Anvers*, by Gens (Antwerp, 1861).

ANUBIS (Eg. *Anepu*), one of the principal Egyptian deities of the second cycle. He was represented either as a dog or a man with a dog's or a jackal's head. Sometimes he wore a double crown. A white and yellow cock was sacrificed to him. The town of Cynopolis, in



Anubis.

the lower Thebais, built in his honor, was the special seat of his worship. He is said to have represented the horizon. The name signifies gilded, and his images were either of solid gold or gilt. He was supposed to be the illegitimate son of Osiris by Nephthys, and was the attendant and guardian of Osiris and Isis. When Osiris was murdered by Typhon, Anubis helped Isis to find his body. He accompanied the souls of the deceased to their place of judgment, and weighed their actions before the tribunal of Osiris. In the Greek mythology he was identified with Hermes.

ANVIL, an iron block with a smooth face on which smiths hammer and shape their work. The smallest anvils, called bickerns, are mostly made of steel. The largest, used with tilt, trip, or steam hammers, are of cast iron, and of a very uniform and simple shape. They are truncated quadrangular pyramids, placed with the small end up, the large resting upon a block of wood fixed in the ground. The middle-sized anvils, on which the forging is performed with sledge hammers, are made of cast or wrought iron. Formerly extra good anvils were made of wrought iron covered with steel, the fibres of which were placed vertically. To do this the bars of steel were cut in pieces about an inch long, which were placed standing side by side, bound by a wire, and welded into a steel plate, which was itself welded to the anvil. The heat necessary for welding very often altered the steel, which was brought back to its original state by the anvil being warmed for a few hours in a box full of cement. It was afterward hardened by pouring a stream of water upon the steel face till the whole block was cooled. The best anvils made in the United States are of cast iron covered with steel; they possess most of the advantages above described, and are comparatively cheap. The covering of steel is placed at the bottom of a mould, and cast iron is poured upon it. Some makers place a core in the mould so as to leave a deep recess nearly reaching the steel covering in the centre of the anvil. The air penetrates into this recess, and the metal is cooled more uniformly.

ANVILLE, Jean Baptiste Bourguignon d', a French geographer, born at Paris in 1697, died there in 1782. At the age of 15 he published a map of ancient Greece. In his 22d year he was appointed royal geographer. He published 211 maps and plans, and 78 *mémoires*. One of his best maps is that of ancient Egypt. His *Orbis Veteribus Notus* and his *Orbis Romanus* have become standard guides for students of ancient history. His "General Atlas," his *Atlas Antiquus Major*, and his maps of Gaul, Italy, and Greece during the middle ages, are celebrated. In 1779 the French government purchased for the royal library his large collection, which consisted of 10,500 maps.

AORTA (Gr. ἀορτή, air vessel), the largest artery in the body. The aorta and arteries were first named air vessels by Greek anatomists, because until the time of Galen they were supposed to contain air instead of blood. The aorta arises from the left ventricle of the heart, ascends a short distance toward the neck, and then curves obliquely backward and toward the left in a semicircular bend, at the level of the second dorsal vertebra, forming the "arch of the aorta." It then passes downward through the posterior part of the chest and abdomen, to the point where it divides into the two common iliac arteries, which are each in turn divided on either side into an internal branch, ramifying into the lower regions of the trunk, and an external branch, descending to the lower limbs. The carotids arise from the arch of the aorta to supply the head and face, and the subclavian arteries derive from the same arch, to supply the different regions of the neck and the upper limbs. Numerous large arteries arise from the aorta or main trunk as it descends from the upper to the lower portions of the trunk; and these divide again into innumerable branches as they ramify minutely and extensively within the body.

AOSTA (anc. *Augusta Prætoria*), a town of Piedmont, in the province and 49 m. N. N. W. of Turin, on the Dora-Baltea, at the foot of the Great St. Bernard, and the southern termination of the Alpine pass of that name; pop. 6,000. It contains many Roman remains, and was the birthplace of Anselm, archbishop of Canterbury, and the scene of the labors of St. Bernard, founder of the hospice bearing his name, who held the archdeaconry of Aosta. The valley in which it stands is famous for its immense pine forests, mines of copper, lead, and iron, and marble quarries. Cretinism and goitre prevail among its inhabitants. The third son of the king of Italy (Amadeus, late king of Spain) derives his title of duke of Aosta from this town, which has been greatly improved during the last 15 years.

APACHES, a fierce nomadic nation of the great Athabascan family, roaming over portions of Texas, New Mexico, and Arizona in the United States, and Sonora, Chihuahua, and Durango in Mexico. The Apaches proper have only temporary war chiefs, and do not cultivate the soil, while the Lipans, a tribe of the same race and language, have their regular chiefs whom they obey; and the Navajos, another tribe of the same language, cultivate the ground and manufacture excellent blankets. The Apaches comprise the Jicarillas, in the Sacramento mountains; the Gila Apaches, on the San Francisco; the Tonto Apaches, on the Sierra del Mogoyen, their impregnable position; the Mimbrenos, in the Sierra de los Mimbres; the Copper Mine Apaches, on the Rio Grande, and for part of each year in Chihuahua and Sonora; the Mascalero Apaches, ranging from the Sierra de Guadalupe to that of San Andrés and west to the Rio Grande; with some smaller bands. As the Spanish settlements advanced the Apaches became the scourge of the frontier, repelling all attempts to civilize and convert them.

No mission was ever established among them, and they drew to them tribes who shook off the Spanish yoke. A document on Sonora in 1762 estimates the mining towns, stations, and missions depopulated by the Apache inroads into that province at 174. Since the annexation of the Apache territory to the United States the tribe have given great trouble, especially those under Mangas Colorado, who for 50 years led very large bands to war, till he was finally captured and killed while attempting to escape, in 1868. Within a few years an effort has been made by the government to gather the Apaches upon reservations under the superintendency of New Mexico, and there feed them. The sum of $125,000 was appropriated for the support of these Indians in 1871, and the experiment of confining them to particular localities is believed to have been attended with some success. The commissioner estimates that in the event of a complete adoption of the plan, it will require an expenditure of $25,000 a month, or $300,000 a year. The plan of establishing the Apaches on reservations and feeding them for a time was much opposed by the people on the frontiers, Mexican and American, who had long been victims of their ravages. This led to a massacre at Camp Grant, Arizona, April 30, 1871, of more than 100 Apaches who were actually prisoners in the hands of the United States troops. Cochise, the great Apache chief, however, submitted, visited Washington, and seemed well disposed. The numbers of the Apaches proper in the United States are variously estimated. Mr. Bartlett thought Schoolcraft's statistics too high. By the Indian commissioner in 1871 they were estimated at 7,500, though Cremony in 1868, from eight years' stay in their country, thinks their number at least 25,000.—The language of the Apaches abounds in guttural, hissing, and indistinct intonations. Mr. Bartlett in his "Report on the Boundary Commission," and others, give vocabularies that establish its connection with the Athabascan family. Their lodges are built of light boughs and twigs. The captain of the band wears a kind of helmet made of buckskin, ornamented with a feather. Their arrows are very long, usually pointed with iron. All are mounted on small ponies, capable of great endurance. The Spanish bit, or simply a cord of hair passed between the jaws, forms their bridle. Panniers for holding provisions are generally carried on the horses of the women. The shells of the pearl oyster, and a rough wooden image, are the favorite ornaments of both sexes. Their feet are protected by high moccasons of buckskin, and the smallness of the foot resulting from this has always distinguished their trail from that of other Indians. Their principal articles of clothing, formerly of deerskin, are now made of coarse cotton cloth. Many of them dress in the breech-cloth only, but they are beginning to wear the blanket and straw hat. The women wear a short petticoat, with their hair loose. Those in mourning for husbands killed in battle cut their hair short. The younger children go almost entirely naked. Those under the age of two years are carried in a kind of osier basket by the mother, in which the child is fastened in a standing posture. When on horseback, the basket is fastened to the saddle. They do not scalp their enemies. They are fond of card-playing and of smoking, and when idle are given to a monotonous kind of singing. When fighting they keep their horses in rapid motion, and are never at rest in the saddle. In their religious ideas they seem to favor the belief in one God; and Montezuma, or his spirit, is blended in their minds with a certain crude religious aspiration. They have a superstitious reverence for the eagle and owl, and for all perfectly white birds. They equally respect the bear, and refuse to kill it or to partake of the flesh. To the hog they have the same repugnance as the Jews and other Asiatic tribes.

APE, a quadrumanous animal of the class mammalia, nearly approaching the human race in anatomical structure. A common distinction between the monkey, baboon, and ape is, that the first has a long and prehensile tail, the second a short one, and the third none at all. According to the modern zoölogical definition, however, the genus ape, or *pithecus*, comprises those quadrumanous mammals which have the teeth of the same number and form as in man, and which possess neither tails nor cheek pouches. This definition, while it excludes certain tailless baboons and monkeys, comprehends the three sub-genera of orangs, chimpanzees, and gibbons. Their arms almost touch the ground when they stand erect on their hind legs; but the legs are scarcely a third part of the entire height. The legs are not on the same line with the thighs; the knees are turned outward, and the soles of the feet turn inward, so as to be opposed to one another. The apes are thus enabled to grasp the trunks of trees with much greater force than if their members were constructed like man's. The fingers and toes are long, flexible, and deeply separated from one another; and the thumb, or anterior finger, is completely opposite to the other four, as well on the hind as on the fore limb. Thus their hands and feet are equally well formed for grasping, and can be used indiscriminately. Hence, apes are neither two-legged and two-handed, like the human race, nor four-footed, like quadrupeds, but four-handed (quadrumanous). When they walk erect, which they rarely do without the aid of a staff or of their forearms, owing to the oblique articulation of the lower extremities, they rest only on the outer edge of the feet. This gives them a tottering and uncertain motion, to remedy which they place the fists of their long arms on the ground, and move in the attitude and at the pace of a lame man going on crutches. Consequently, while on the ground, they are slow, inert, and helpless animals, although in their native forests, passing from bough to bough and from tree to tree, they are the most agile of all creatures.—The character and habits of the great apes in a state of nature are little understood. Notwithstanding the gentleness and docility of those brought young from their native climates, there is reason to believe that in their native wilds they become as they grow old fierce, dangerous, and perhaps even carnivorous; for, although the number of their teeth and the formation of the molars and incisors precisely resemble those of the human being, the canines are developed in the same relative proportion as in the carnivora, so much so that the tusks of a full-grown orang-outang are fully equal to those of a lion. In confinement, however, they are almost wholly free from the mischievous and petulant curiosity and violent fits of passion which characterize the smaller monkeys; are deliberate in their actions, circumspect, intelligent, and susceptible of a high degree of attachment to those who take care of them, or with whom they consort. They have two singular points of resemblance to man in their habits, which are worthy to be contrasted with the structural dissimilarities which have been insisted on above: 1. They do not repose, like the other monkeys, squatting on their hams, but stretch themselves on their sides, like human beings, and support their heads on their hands, or find some natural substitute for a pillow. 2. Alone of animals, they use other means of defence or attack than their own natural means, strength, and weapons, readily betaking themselves to the use of stones and clubs, which they wield with considerable dexterity, either hurling them as missiles, or using them hand to hand. In their mental powers, or intelligence, the apes in nowise approach the dog, the elephant, or the horse, although their natural facility of imitating human action has obtained for them the credit of approaching nearly to human comprehension.—See Chimpanzee, Gibbon, Gorilla, and Orang-Outang.

APELDOORN, a town of Holland, province of Gelderland, 15 m. N. of Arnhem; pop. in 1868, 12,087. In 1871 it had 42 manufactories of papier maché. Near it is the royal castle of Loo.

APELLES, the most celebrated of Greek painters, born, according to Pliny and Ovid, in the island of Cos; according to Suidas, at Colophon. Strabo and Lucian call him an Ephesian, but he appears to have been such only by adoption, and to have studied at Ephesus. His instructors were Ephorus the Ephesian, Pamphilus of Amphipolis, Melanthus, and, according to Athenæus, Arcesilaus. The masterpiece of Apelles was his Venus Anadyomene, or "Venus Rising from the Sea," the model for which is believed to have been either Phryne or Campaspe, one of the royal mistresses whom Alexander the Great resigned to the painter. This painting was ultimately placed by Augustus in the temple of Julius Cæsar, where it was gradually destroyed by age. It is said that Alexander, whom, according to some, Apelles accompanied in his expedition to Asia, would allow no one but Apelles to paint his portrait; and one of his paintings representing Alexander holding a thunderbolt was sold for a sum equal to about $200,000. He was accustomed, when he had completed a piece, to expose it to the view of passers-by, and to hide himself behind it in order to hear the remarks of the spectators. On one of these occasions a shoemaker censured the painter for having given one of the slippers of a figure a less number of ties than it ought to have had. The next day the shoemaker, emboldened by the success of his previous criticism, began to find fault with a leg, when Apelles indignantly put forth his head and desired him to confine his criticism to the slipper. Hence arose the expression *Ne sutor ultra crepidam*, "Let not the cobbler go beyond his last."

APELT, Ernst Friedrich, a German metaphysician, born at Reichenau, March 3, 1812, died in Jena, Oct. 27, 1859. He was a professor at Jena, and a disciple of Jacob Friedrich Fries, whose theories he supported in various works, especially in the 2d volume of his *Epochen der Geschichte der Menschheit* (Jena, 1845). He edited Fries's posthumous *Politik, oder philosophische Staatslehre* (1848), and wrote *Theorie der Induction* (Leipsic, 1854), *Metaphysik* (1857), and *Die Reformation der Sternkunde und Religionsphilosophie* (1860). His philosophical method has been described as combining the theories of Kant with the ideas of Jacobi, and is fully explained in Kuno Fischer's *Die beiden Kant'schen Schulen in Jena* (Stuttgart, 1862).

APENNINES, a chain of mountains in Italy, extending, with but trifling intervals between its principal groups, through the entire length of the Italian peninsula, from the Maritime Alps to the straits of Messina, a distance of 800 m. Through the greater part of its extent the chain is about equally distant from the Adriatic and the Mediterranean. No part of it is above the limit of perpetual snow; its highest peak, Monte Corno, near Aquila, rises only 9,542 ft. above the sea; while the average height of the range does not exceed 4,200 ft. To the height of 3,000 ft. the Apennines are generally covered with forests; above this their sides are bare and rugged, and their summits rough and broken, not rising into symmetrical peaks or needles, like those of the Alps.—The range is divided by the best geographers into five portions, the Ligurian, Tuscan, Roman, Neapolitan, and Calabrian Apennines. These are in turn divided into smaller groups. 1. The Ligurian Apennines, which are not in reality separated at their western extremity from the Maritime Alps, are generally considered as beginning near the source of the Bormida, a short distance W. of Savona, though the point of division between them and the Alps is differently assumed by different geographers. They run N. E. as far as the pass of the Bocchetta, N. of Genoa, and then S. E., following the trend of the coast, and joining the Tuscan Apennines a short distance S. of Monte Pellegrino. Their entire length is about 130 m. The breadth of the chain varies greatly; in the north its spurs extend nearly to the Po. West of the Bocchetta pass the summits are low, seldom rising more than 2,000 ft.; but beyond this to the eastward the height of the range increases. Its principal peaks, all between 5,000 and 6,000 ft. high, are Monte Antola, N. E. of Genoa; Monte Penna, near Chiavari; Monte Gottaro, W. of Pontremoli; and Monte Pellegrino, N. of Castelnuovo. Several important roads cross the chain; one (with a railway), at the pass of the Bocchetta, is the means of communication between Genoa and the towns N. of the mountains; a second, from Parma to Pontremoli, crosses by the pass of La Cisa; another, at the western extremity of the range, leads from Millesimo to Savona; while smaller passes are found at different points. The pass of the Bocchetta is famed for the grandeur of its scenery; and the whole aspect of the Ligurian Apennines is more picturesque than that of any other portion of the great chain. 2. The Tuscan Apennines begin with Monte Cimone, and, extending S. E. for about 80 m., end with the Alpe della Luna, near the pass through which runs the road from the valley of the Tiber to Urbino. Monte Cimone (6,978 feet) is the highest peak. To this portion of the chain belong, besides some less important detached groups, the Alpi Appuane, which rise to a height of 5,800 ft. (the Pizzo d'Ucello being their highest summit), run nearly parallel with the main range, and extend to the valley of the Arno. In these mountains is found the celebrated marble of Carrara; the principal quarries are in the sides of Monte Sairo, near the town of Carrara. 3. The Roman or Central Apennines extend S. E. a distance of about 150 m., and include, especially in that portion best known as the mountains of the Abruzzi, all the highest peaks of the whole range. Here lies the great group of the Gran Sasso d'Italia, whose summit, Monte Corno, or Monte Cavallo, is the highest point of the Apennines, 9,542 ft. above the sea. The range is broader here than at any other point; the mountain groups of the Abruzzi form a large square, and throw out spurs in all directions. The lake of Celano lies among the southern mountains of this chain, at an elevation of nearly 2,200 ft. The Roman Apennines are traversed by many passes, and surround fertile upland valleys and elevated plains. Besides Monte Corno, the principal peaks are Monte Amaro, in the detached group of the Majella, which rises to the height of nearly 9,000 ft.; Monte Vellino, 8,183 ft.; Monte Vittore, 7,398 ft.; Monte Sibilla, 7,212 ft.; and Il Terminillo Grande, 7,034 ft. 4. The Neapolitan Apennines begin near the southern limits of the Abruzzi, and extend in a broad chain, with many considerable offshoots, to Monte Volture, near which they begin to divide into two branches. One of these runs S. E. as far as the gulf of Taranto. Beyond the river Ofanto it dwindles to a range of low hills, and finally almost disappears in the district of Otranto. The other branch takes a southerly direction, to the pass of Lagonegro. To the eastward of the Neapolitan range, but so widely separated from it as to properly form a distinct ridge, lies Monte Gargano (5,450 ft.), extending into the Adriatic, and forming the rugged promontory N. of the gulf of Manfredonia. The highest peak of the chain is Monte Miletto, 6,744 ft.; but the average height of this division is less than that of the others. 5. The Calabrian Apennines, beginning at the pass of Lagonegro, fill the peninsula of Calabria, and terminate in the mountain promontory of Aspromonte, the highest summit of which rises 4,500 ft. above the sea. A singular and almost complete break is made in them by a deep valley, which runs from the gulf of Santa Eufemia to the gulf of Squillace, and divides the chain into two distinct groups. The Calabrian Apennines have no very lofty or noteworthy peaks, but their scenery is rugged and picturesque. They are granitic, and differ in their geological features so entirely from the rest of the Italian chain that most geographers, while applying the name Apennines to them in compliance with general usage, really class them as a separate system.—West of the Apennines, and filling much of the country between them and the Mediterranean, lies a separate system of lower mountains, different from them both in appearance and geological formation. These are called the Sub-Apennines. They include many mountains of volcanic origin, and are the result, according to the best authorities, of a much later convulsion than that which undoubtedly threw up the more massive pile of the main range. 1. The Tuscan Sub-Apennines occupy the space between the Arno and the Tiber, reaching their greatest height in the S. E. part of this tract. They surround a great part of the plain of the Arno. Among their best known groups are the Ciminian hills. 2. The Roman Sub-Apennines are almost all of volcanic origin; they extend from the Tiber, and surround the principal part of the Campagna di Roma. The Alban hills are a part of this division, which, running southward along the coast, ends at the promontory of Gaeta. 3. The Neapolitan Sub-Apennines include in their southern portion the volcanic group of which Mt. Vesuvius is the great centre, and extend to the Punta della Campanella.—The mountains of Sicily undoubtedly form, with few exceptions, a part of the system of the Apennines. (See SICILY.)—Limestone, chalk, and sandstone are the basis of the northern portion of the Apennines, and of most parts of the main chain through the entire peninsula;

tertiary formations containing abundant fossils distinguish many of the offshoots, and, as has been already noticed, groups of purely volcanic mountains appear in many places among the Sub-Apennines, and even approach the main range, to the system of which they in no way belong. This volcanic formation is found only on the western side of the chain.—For the vegetation of the Apennines, the rivers flowing from their sides, the methods of cultivation employed on their fertile lower slopes, and the people inhabiting the mountain country, see Abruzzo, Calabria, and Italy.

APENRADE, a seaport town in the Prussian province of Schleswig, situated on the Baltic, 20 m. N. of Flensburg; pop. in 1871, 5,932. On March 30, 1848, there was here an encounter between the Prussians under Wrangel and the Danes. Near the town is the castle of Brundlund.

APHIS, the plant louse, or puceron, a genus of insects included in the order *homoptera.* The number of species is very large; 326 are described in Francis Walker's list of specimens of homopterous insects in the collection of the British museum. Almost every sort of plant furnishes a living to a different kind of aphis. The attacks of these insects are often ruinous to certain crops. The *A. rosæ* is most destructive to the rose tree, on which it is constantly found. Apple trees and pear trees are attacked by a species of aphis which injures their fruit. Cabbage and turnip crops are sometimes destroyed by swarms of the *A. brassicæ.* Their attacks on all plants seem to be regulated by the health of the plant and the peculiarities of the season. If atmospheric conditions render the plant unhealthy, then the aphis appears; if these cease, the aphis disappears; and one crop of plants may be attacked several times in the same year. Most species of this insect are green; but a dark species, the bean dolphin, or *A. fabæ,* attacks the bean, whole acres of the plant being suddenly covered by these black insects. They have, however, many destructive foes. The larvæ of the lady-bird (*coccinellidæ*), the *syrphus* or bee-like fly, the *chrysopa* or lace-wing, and several species of *ichneumonidæ,* pursue and eat them very greedily. Tobacco is the principal remedy against destructive swarms of the aphis. In conservatories, or where plants can be placed under cover of any kind, they may be easily exposed to clouds of tobacco smoke, and that is the simplest way of destroying the aphis; but in the open air, where the fumes of tobacco easily disperse, the best way is to apply the tobacco in water. The affected parts may be syringed with the infusion of tobacco, and after the effect is produced, the plant may be washed by the rain or with pure water.—These insects have a soft, roundish body, a small head, complete and half-globular eyes, antennæ of from 6 to 11 joints, longer than the head and often hairy. The beak has its origin from the lower part of the head, between the fore legs, and in the act of sucking is held nearly perpendicular. The wings, when developed, are 4 in number. The legs are very long and slight. Near the extremity of the abdomen above, most kinds of aphis are provided with a pair of tubular horn-like processes, through which they eject a sweet, thickish fluid, commonly called honey-dew, of which ants and many other insects are very fond.—At the end of autumn many of the species, such as the *A. quercus* and the *A. rosæ,* of both sexes, are numerous, some winged, and some without wings. While some can fly to a distance, others, without wings, are restricted to the neighborhood of their native plant. As soon as she has paired, the mother aphis deposits her eggs or larvæ in a place fit for passing the winter, different places being selected by different species. Some prefer the oak, and leave their eggs on some waving bough high in the air; others in the crevices of the bark, or in a subterraneous receptacle. Bonnet supposes that the aphides are always viviparous, and never lay eggs; what are commonly called eggs, produced in the autumn, being a sort of cocoon, containing the young aphis enclosed in an envelope. This, however, is not universally admitted. The parents die after disposing of their eggs or cocoons, and these remain torpid during the winter. All the aphides which appear in spring are females, which are endowed with a most wonderful spontaneous fecundity, no pairing being possible, as no males appear till autumn. Latreille states that one female during the summer months will produce 25 daily, each of which will in turn do the same, and so on for several generations in a single season. Réaumur calculated that one aphis may be the progenitor of about 6,000,000,000 descendants in its own lifetime. The *A. lanigera* produces each year, says Prof. Owen in his "Lectures on Comparative Anatomy," 10 viviparous broods, and one which is oviparous; and each generation averages 100 individuals. The progression is 1, 100, 10,000, 1,000,000, 100,000,000, 10,000,000,000, 1,000,000,000,000, 100,000,000,000,000, 10,000,000,000,000,000, 1,000,000,000,000,000,000, for the 10 viviparous broods; and by adding the oviparous generation, the result is 30 times greater. The female aphides thus produced are considered as larvæ, presenting a more developed condition than the larvæ of coleoptera and lepidoptera. The compound eyes are completely developed; the antennæ have attained their perfect shape and proportions, the 6 thoracic legs their full size and power. The only subsequent change of these fertile larvæ is an additional size and the manifestation of the organs of reproduction. In the last generation, which is the 7th, the 9th, or the 11th, according to the species of aphis, the spontaneous power of reproducing their species is totally lost; wings are developed, and winged male insects now make their appearance. The females of the present generation are the winged insects which produce eggs and deposit them where they may be hatched by the sun in times of blight. The number of aphides which appear in spring must, of course, depend on the number of eggs laid in the preceding autumn; but countless swarms of them being ushered into life at the same time has led to the notion that they are generated by the atmosphere.

APHRODITE. See Venus.

APICIUS, the name of three noted Roman epicures. **I.** Lived in the earlier part of the 1st century B. C. He spent much of his time at intervals in Latium, on account of its excellent lobsters, but having heard that the African lobsters were larger, set sail for that continent. Several fishermen came off to his vessel with the finest; but seeing that they were inferior to those of Minturnæ, he ordered the pilot to steer for Italy. He is said to have procured the banishment of Rutilius Rufus in 92. **II. Marcus Gabius,** who lived in the time of Augustus and Tiberius, established a school where the art of good cooking was taught. In the cultivation of his own appetite and that of his scholars, he had expended more than $3,000,000, when he settled up his accounts, and perceiving that but about $300,000 remained, concluded that he could not live as he wished upon that sum, and poisoned himself. He invented several sauces and cakes which long bore his name. Apion, the grammarian, made his life and labors the basis of a volume; and all cooks for centuries belonged to the Apician or anti-Apician faction. **III.** A contemporary of Trajan, who taught the world how to pickle oysters.—A treatise, *De Re Culinaria*, or *De Obsoniis et Condimentis*, &c., bearing the name of Cælius Apicius, by an unknown writer (probably a Cælius who added to his own the famous name of Apicius), is the most ancient cookery book in the world.

APIS (Egyp. *Hapi*, a name closely resembling that of the Nile), a bull worshipped by the Egyptians. In their mythology the soul of Osiris, murdered by the evil spirit Typhon, migrated into this bull. It was therefore the symbol of creative productivity and fertility. The calf was born from a cow made pregnant by a ray of the sun and one of the moon. It must be black, with a white triangular or square spot on the forehead, a vulture or an eagle on the back, various other mystical signs on various parts of the body, and a scarabæus under the tongue. Its principal worship was in Memphis, in the temple of Phthah (Hephæstus, Vulcan, or fire). When such a calf was found, the priest transported him in a chariot with great pomp to Heliopolis, where he was kept in a temple accessible to the worship of the people for 40 days. After that lapse of time no one could approach him, and he was transported to Memphis, where he had his own temple, with chapels and courts for exercise, and his own priests. The lifetime of Apis was 25 years, in harmony with one of the theologico-astronomical cycles of the Egyptians. After the death of one and before the finding of another Apis, the whole land was in mourning. Apis in heaven was placed in the constellation of Taurus.

APLANATIC LENS (Gr. *ἀ* privative and *πλανητικός*, wandering), a lens made in such a way as to correct the spherical aberration. When rays come from a great distance, this may be done by making the curve of a lens parabolic in place of spherical, and in telescopes it is accomplished by careful repolishing by hand and testing. For microscopic and photographic lenses, however, a system of two or even more double achromatic lenses is employed, of which the curves are such that all the rays emitted from one point come to a single focus in a corresponding point. Such a microscopic lens is said to consist of an aplanatic system of lenses, and perfection in this respect is the great problem, now being solved by manufacturers of microscopes and photographic cameras.

APOCALYPSE (Gr. *ἀποκάλυψις*, unveiling), or **Revelation of St. John,** the name of the last book of the New Testament. The church at an early period appears to have ascribed the authorship of the book to John the evangelist. Papias and Melito of Sardis, according to the testimony of Eusebius, regarded the Apocalypse as inspired. Justin Martyr and Irenæus expressly quote the Apocalypse as the work of the apostle John; and the third council at Carthage, in 397, admitted it into its list of canonical books. On the other hand, Dionysius, bishop of Alexandria, testifies that some church writers before him repudiated the Apocalypse as a forgery of Cerinthus; and he himself undertakes to prove that it was not the work of the apostle John, but of some other John who lived in Asia. That this opinion was shared by other prominent men of the church may be inferred from the fact that the Apocalypse is absent from the ancient Peshito version. Jerome moreover states that the Greek church felt with regard to the Apocalypse a doubt similar to that entertained by the Latins with regard to the Epistle to the Hebrews. The rejection of the canonical and apostolical character of the book was chiefly prompted by opposition to chiliasm; and when the interest in the chiliastic controversies declined, the church generally recognized the Apocalypse as a work of the apostle John. In modern times the question of the apostolic origin of the book was revived by Semler, and many of the prominent exegetical writers of the Protestant churches (in particular De Wette, Ewald, Lücke, and Baur) undertook to prove that the Apocalypse and the Gospel of John could not possibly have been written by the same author. While, however, most of these writers deny that it was written by the apostle John, Baur, Hilgenfeld, and other critics of the Tübingen school, ascribe the Apocalypse to him, but not the fourth Gospel. Among those who have recently undertaken to prove that neither the fourth Gospel nor the Apocalypse was written by St. John, Th. Keim (*Geschichte Jesu von Nazara*, vol. i., 1867) and

Scholten (*De Apostel Johannes in Klein-Asië*, Leyden, 1871) are the most prominent. The Johannean origin of both the Apocalypse and the fourth Gospel was, on the other hand, vindicated against the critical schools by Hengstenberg, Hase, Godet, and in particular by Niermeyer (*Verhandeling over de Echtheid der Johanneische Schriften*, the Hague, 1852).—No book of the New Testament has received so many different interpretations. Two principal classes of expositors may be distinguished, the historical or continuous and the preterist. According to the opinion of the former, which is shared by nearly the entire ancient church, the Apocalypse is a progressive representation of the entire history of the church and the world. Sir Isaac Newton, Bengel, E. B. Elliott, Wordsworth, Hengstenberg, Ebrard, and Alford are prominent representatives of this class. Writers of this school have found in the Apocalyptic visions prophetic references to nearly every great event of the Christian era, such as the migration of nations, the reformation, the pope, the French revolution, and Napoleon; and the calculations of the millennium have led to varying results, and in some instances even to the establishment of particular sects. The date of the Apocalypse is given by these writers as A. D. 95–97. The preterist mode of interpretation, according to which the Apocalypse has been almost or quite fulfilled in the time which has passed since it was written, and refers principally to the triumph of Christianity over Judaism and paganism, found able advocates in Grotius, Bossuet, and Calmet, and since Herder and Eichhorn has become the exclusive interpretation of all the liberal Protestant schools of theologians. Among the recent champions of this school, Ewald, Lücke, Bleek, Stuart, Lee, and Maurice are best known. According to their view, the seven heads are seven emperors. As Galba was accounted as the sixth of the emperors, the book is supposed to have been written during his reign (in 68). The fifth, who will return as the eighth, is Nero, who at that time was believed not to be dead, but to have retired to Parthia, whence he would return. In the symbolical number 666 these writers commonly find the words "Neron Kaisar," written in Hebrew letters. Some writers, chiefly English, believe that, with the exception of the first three chapters, the book refers wholly or principally to events which are yet to come. Swedenborg regards the Apocalypse as a peculiar revelation of divine truth, the book of all books which is least encumbered by literal references to mundane things, and most remarkable for the completeness with which it contains the heavenly word.

APOCRYPHA (Gr. ἀπόκρυφος, concealed), hidden or unpublished books. This term is variously applied in the Roman Catholic and Protestant churches. The Roman Catholic church gives the name Apocrypha to those books to which a reception into the canon of the books of the Old Testament was refused. Protestant theology generally designates these books by the name *pseudepigrapha*, and calls Apocrypha those books the inspired character of which was long a subject of dispute in the church, and which were finally declared by the council of Trent to be a part of the canon. They are not contained in the Hebrew canon of the Old Testament; but as the Septuagint embraced them, they are frequently quoted by early church writers as sacred books, were expressly received into the Christian canon by a synod of African bishops held at Hippo in 393, and were thereafter generally accepted as canonical books by the Latin church. By the Catholics these books are called deuterocanonical or antilegomena. The following books are included in this class: 1 Esdras, 2 Esdras, Tobit, Judith, Esther x. 4–xvi., Wisdom, Ecclesiasticus, Baruch, Song of the Three Holy Children, History of Susanna, Bel and the Dragon, Prayer of Manasses, 1 and 2 Maccabees. The Protestant churches continued to print the apocryphal or deuteronomical books of the Old Testament in their various editions of the Bible until about 1821, when discussions arose in the British and foreign Bible society which resulted in 1826 in a resolution that that society should no longer circulate the apocryphal books. German Protestants are divided on the subject; some theologians, as Ebrard and Keerl, declaring against the reception of the Apocrypha into the Protestant Bibles, but others, including Hengstenberg and Stier, in favor of it. The Greek church, at the synod held in Jerusalem in 1672, recognized the Apocrypha as inspired books.—That class of books to which the Roman Catholic church exclusively applies the name of apocryphal is very numerous. The most important among those relating to the Old Testament are the third and fourth books of Esdras, and in particular the book of Enoch, which has only been preserved in an Ethiopic translation (published for the first time in 1838 by Laurence). The apocryphal books of the New Testament comprise a number of spurious gospels, acts, epistles, and apocalypses, many of which were written by heretics in the interest of their sects. A complete collection of the apocryphal literature of the New Testament was begun by Thilo (*Codex Apocryphus Novi Testamenti*, vol. i., Leipsic, 1832, containing nine apocryphal gospels). After the death of Thilo the work was continued by Tischendorf, who published in succession the Apocryphal Acts (*Acta Apocrypha*, Leipsic, 1852), a new collection of Apocryphal Gospels (*Evangelia Apocrypha*, 1853), and the Apocryphal Apocalypses (*Apocalypses Apocryphæ*, 1866). An English translation of part of them by William Hone was published in London in 1820.—See "Contributions to the Apocryphal Literature of the New Testament," by W. Wright, and "Apocryphal Acts of the Apostles," edited from Syriac MSS., with an English translation, by the same author (2 vols., London, 1871).

APOLDA, a town in the grand duchy of Saxe-Weimar, on the Thuringia railway, about 12 m. E. N. E. of Weimar; pop. in 1867, 8,882. It is remarkable for its manufacture of hosiery, which has been developed chiefly within the last ten years. Upward of 1,200 looms are in operation (1872), employing 11,000 persons. Steam power is used in the two principal establishments. There are also iron and bell founderies. There is a mineral spring, discovered in the 18th century. The castle near the town and the adjoining domain belong to the university of Jena.

APOLLINARIANS, an heretical sect, founded about 362 by Apollinaris, bishop of Laodicea, who, in his zeal against the Arians, sought to impress the following modifications on the Nicene creed: 1. That since two perfect beings cannot coalesce in one person without the production of a monster, therefore in the nature of Christ is not found the union of perfect God with perfect man. 2. That there is no human *νοῦς* or rational soul in Christ, the divine, or perfect God, standing in place of it. 3. That there is but one nature in Christ, and that has both a divine and human side, and the connection between them is so organic that they may each be regarded as vested with the attributes of the other. Apollinaris was censured by the councils of Alexandria and Constantinople, and Athanasius appeared as his antagonist. He died about 390. His doctrine is one of the steps in that great movement which springs out of the discussion of the dual nature of Christ, and which next reappeared in Monophysitism, into which many of the followers of Apollinaris naturally fell, while others returned to the communion of the church.

APOLLO, one of the principal gods of Grecian mythology, called also Phœbus, and in Homer and Hesiod generally designated as Phœbus Apollo. He was the son of Jupiter and Latona, and twin brother of Diana. Homer and Hesiod give no details about his birth; but later writers relate that Juno had put under ban all lands which should harbor Latona, who was then pregnant. Delos was an uninhabited rock in the Ægean, just risen above the surface of the sea. There Latona, after nine days' labor, brought forth Apollo and his sister. The earlier mythology of the Greeks, as reflected chiefly in Homer, represents Apollo as an archer who inflicts vengeance with his arrows; as a god of song and stringed instruments, in which character he is said to have invented the phorminx; as a revealer of the future, a function which he exercised especially at the temple of Delphi; and as a god of flocks, in which capacity he kept the herds of King Admetus. In the later poets he is the same as the god Helios, or the sun, but in the earlier Phœbus Apollo and Helios are quite distinct. With the advent of the lyrical poets Apollo becomes a patron of the healing art. In this aspect he is the father of Æsculapius. He was the president and protector of the muses. He is usually represented in the prime of youth and manly beauty, with long hair, his brows bound with the sacred bay tree, and bearing the lyre or the bow. The most celebrated places where Apollo was worshipped were Delphi and Abæ in Phocis, Ismenium near Thebes, Delos, Tenedos, Didyma near Miletus, Patara in Cilicia, and Clarus near Colophon. The hawk, the raven, the swan, and the grasshopper were his favorite animals. Apollo was the peculiar god of the Dorians. He had musical contests with Marsyas and Pan. According to Herodotus, the Egyptian synonyme of Phœbus Apollo is Horus. The Romans received him from the Greeks. We first hear of his worship at Rome in 430 B. C., when a temple was raised to him for the purpose of averting a plague. During the second Punic war, in 212, the *ludi Apollinares* were established at Rome. Every centenary anniversary of the *ludi*, they celebrated in his honor the *ludi sæculares*. Horace wrote the *Carmen Sæculare* on such an occasion.

APOLLO BELVEDERE, a statue, perhaps the greatest existing work of ancient art, representing the god Apollo at the moment of his victory over the Python. It was found in 1503 among the ruins of ancient Antium (now Porto d'Anzo), and derives its name from its position in the Belvedere of the Vatican, where it was placed by Pope Julius II., who had purchased it before his accession to the papal throne. It was removed by the French in 1797, but replaced after 1815. The statue is of heroic size, and shows the very perfection of manly beauty. The god stands with the left arm extended, still holding the bow, while his right hand, which has just left the string, is near his hip. This right hand and part of the right arm, as well as the left hand, were wanting in the statue when found, and were restored by Angelo da Montorsoli, a pupil of Michel Angelo. The figure is nude; only a short cloak hangs over the left shoulder. The breast is full and dilated; the muscles are conspicuous, though not exaggerated; the body seems a little thin about the hips, but is poised with such singular grace as to impart to the whole a beauty hardly possessed by any other statue. The sculptor is unknown; many attribute the statue to Agasias the Ephesian, others to Praxiteles or Calamis; but its origin and date must remain a matter of conjecture.

APOLLODORUS OF CHARYSTUS, a comic poet of the new Attic comedy, flourished about the middle of the 3d century B. C. Terence took from him the plots of several of his plays.

APOLLONIA, a city of ancient Illyria or New Epirus, near the mouth of the river Aous (now the Voyutza in Albania). It was founded by colonists from Corinth and Corcyra. The place, having suffered much from the attacks of the Illyrians, sought the protection of the Romans, and remained faithful to them during the Macedonian war. A few huts, a monastery, and a church, together with the remains of two temples, are the vestiges of the city.

APOLLONIUS PERGÆUS, an ancient geometer of Alexandria, born at Perga in Pamphylia, flourished about 230 B. C. His work upon the conic sections gained for him from his contemporaries the title of the Geometer. Only four books of this work have come down to us in the original language. Three more are preserved in Arabic, and the 8th is lost.

APOLLONIUS RHODIUS, the author of the Argonautics, an epic poem on the voyage of the Argo, flourished at the close of the 3d century B. C. He spent much of his youth in Alexandria, of which he is supposed to have been a native, and there composed his poem, which is still extant. He read it publicly, but the Alexandrians treated it with contempt; and this so angered him that he left the city and went to Rhodes, where he long resided, taking his surname from the town. The Rhodians received his work with the greatest favor. Later in life he returned to Alexandria, and, by reading the revised poem in full, so changed the opinion of it held by the Alexandrians that they covered him with honors. He was made librarian of the museum, an office which he is supposed to have held till his death. He was buried in the same tomb with Callimachus, with whom in his youth he had had a violent quarrel regarding the merits of his poem. His epic, in four books (*Argonautica*), gives a simple, beautiful, and vigorous sketch of the Argo's expedition. Apollonius also wrote epigrams (of which one on Callimachus is still extant), and several works which are lost.

APOLLONIUS TYANÆUS, a Pythagorean philosopher, born at Tyana, Cappadocia, about 4 B. C. He travelled for many years through Asia Minor and the East, disputing everywhere concerning the mysteries of nature and religion. From Babylon he journeyed to India, where he disputed with the Brahmins on the comparative merits of the Alexandrine and oriental philosophers. He laid claim to supernatural power, and is said to have received from priests and people divine honors. At Athens he was denied admission to the Eleusinian mysteries, because he was regarded as a magician. It was only by force that he obtained an entrance into the cave of Trophonius, where he is said to have found the theological books of Pythagoras. At Rome he was arrested and brought to trial as a practiser of the black art, but acquitted. After visiting Spain, Africa, and Greece a second time, he bent his course to Alexandria. Vespasian was then in Egypt preparing to strike a blow for the imperial purple, and hearing of Apollonius's arrival, he determined to turn to account the influence which the philosopher possessed with the people as a prophet and thaumaturgist. Accordingly, when Vespasian, on his entrance into the city, was met by the magistrates and philosophers, he inquired with affected anxiety whether the Tyanæan was present. Being answered in the negative, he at once proceeded to the place where he was, and entreated Apollonius to make him emperor. The Pythagorean rejoined that he had already done it in praying to the gods for a just and venerable sovereign. At a council of philosophers presently held in Alexandria to consider the claims of Vespasian, Apollonius warmly advocated the cause of his new patron. Having, after the death of Titus (81), been accused of attempting to excite the Greek cities of Asia against the tyrant Domitian, he voluntarily surrendered himself, and was cast into prison at Rome loaded with chains. His biographer, Philostratus, says that he freed himself from captivity by the exercise of his supernatural powers. Apollonius himself, at a subsequent period, publicly stated in Greece that he owed his liberty to the clemency of the emperor. Several cities contended for the honor of having been the last residence of Apollonius, but it seems most probable that his old age was spent at Ephesus. Tyana, the place of his birth, was raised to the rank of a sacred city, and invested with peculiar privileges, and here during the supremacy of paganism a temple existed in which the Pythagorean was worshipped. He used no animal food, wore no woollen garment, suffered his hair to grow, and abjured the society of women. As a philosopher he labored to reconcile the oriental and Greek systems with the symbolism of his master. As a religious reformer he sought to restore the rites of paganism to their pristine purity. He held that all sensible objects were material and corruptible; that all sacrifice was impure in the sight of the gods; and that even prayer itself became polluted when it passed the lips of the supplicant. Except some letters and a reply against a complaint of the philosopher Euphrates, all his works have perished.

APOLLOS, an Alexandrian Jew, converted to Christianity about A. D. 54. He began (Acts xviii. 24) to preach at Ephesus, "knowing only the baptism of John," and was afterward instructed by Aquila and Priscilla, and sent into Achaia. At Corinth he was very popular, dividing fame with Paul and Peter, as it appears from that apostle's reference in 1 Cor. i. 12: "Every one of you saith, I am of Paul, and I of Apollos, and I of Cephas."

APOLLYON (Gr. 'Απολλύων, the destroyer), used in Rev. ix. 11 as a translation of the Hebrew *abaddon*. In the Old Testament *abaddon* signifies the subterranean region, or place of the dead, equivalent to the Greek Hades. The rabbins, however, divide this region into two portions, the upper being the grave, the lower abaddon, founding this distinction especially upon Ps. lxxxviii. 11, "Shall thy loving kindness be declared in the grave, or thy faithfulness in destruction [abaddon]?" In Revelation Apollyon is personified as the angel who has dominion over the bottomless pit, the chief of the destroying agents, represented under the figure of locusts, who emerge from the abyss at the sounding of the fifth trumpet. Some apocalyptic expositors have held that the locusts represent the Saracens, and that Apollyon means especially Mohammed; but it is more likely that the figure is a general representation of the convulsions attending the breaking down of paganism and the establishment of Christianity. In the "Pilgrim's Progress" Apollyon is the name of the evil spirit encountered by Christian in the valley of the shadow of death; hence the word has come to be almost a synonyme for the chief of the fallen angels.

APOPLEXY. See BRAIN, DISEASES OF THE.

APOSTLES (Gr. ἀπόστολοι, the sent, messengers), a title bestowed in the New Testament upon all who were commissioned to preach the gospel of Christ, but especially upon the twelve whom Jesus chose from the whole number of his disciples to be his heralds among Jews and Gentiles. Their names were—Simon Peter, Andrew, James (son of Zebedee), John, Philip, Bartholomew, Thomas, Matthew (Levi), James (son of Alpheus), Lebbeus (Thaddeus), Simon, and Judas Iscariot. They were mostly Galileans and laboring people, all being fishermen but Matthew, who was a tax-gatherer. Some of them were connections of the family of Jesus or companions of his youth, and they had been disciples of John the Baptist before Christ's appearance. They accompanied Christ on his journeys, witnessed his works, heard his public teaching and discussions, and the more intimate of them (Peter, James, and John) were often admitted to the privacy of his meditations. During his lifetime the apostles undertook one missionary expedition at their Master's bidding; but after the resurrection the eleven remained in Jerusalem, not openly distinguished from other Jews. The place of Judas was filled by Matthias. It was not until the day of Pentecost that their work commenced in earnest with the public announcement of Christ as the Messiah. The persecution to which Stephen fell a victim scattered the believers (some think only those of Greek extraction); but the apostles still continued in the city or in Judea, Peter alone venturing reluctantly to make a short journey as far as Cæsarea, where he baptized some uncircumcised people.—The work assigned by Christ of preaching the gospel to "all the world," left unattempted by the original apostles, who wished to confine its blessings to the circumcised Jews, was first fully undertaken by Paul, a man who had never seen Jesus on earth, had received no commission from him like the rest, had sought from Peter and his companions no authoritative exposition of the Master's truth, and was at first an object of suspicion. All that we know from historical records respecting the apostles is gathered from the letters of Paul and the book of Acts, though legends about all of them were early current, recounting their voyages, sufferings, and martyrdoms. An interesting account of the apostles' labors is found in Neander's "Planting and Training of the Christian Church." Schwegler's *Nachapostolisches Zeitalter* should also be consulted.

APOSTLES' CREED, the oldest, most comprehensive, and most universally accepted creed of Christendom, interesting from its antiquity, and still more from its general adoption by the Greek, Roman, and Protestant churches. It reads as follows: "I believe in God the Father Almighty (Maker of heaven and earth): and in Jesus Christ his only Son our Lord; who was conceived by the Holy Ghost, born of the Virgin Mary; suffered under Pontius Pilate, was crucified, (dead,) and buried; (he descended into hell,) the third day he rose from the dead; he ascended into heaven, and sitteth on the right hand of (God) the Father (Almighty); from thence he shall come to judge the quick and the dead. I believe in the Holy Ghost; the holy (catholic) church, (the communion of saints;) the forgiveness of sins; the resurrection of the body; (and the life everlasting.) Amen." The passages enclosed in parentheses are additions to the original form, which was complete by the middle of the 2d century. The nucleus of the creed is supposed to have been the formula of baptism, "in the name of the Father, and of the Son, and of the Holy Ghost," to which the other articles were appended, the whole forming a brief summary of historical statements from the New Testament in regard to the Father, Son, and Spirit. The creed is rather an epitome of recorded facts than a system of speculative opinions, and was never designed nor used to express the philosophical thoughts of the church. The impression that this venerable symbol was regarded as a secret formula, part of the *disciplina arcani*, is erroneous. The tradition that it was made by the apostles themselves, who at a meeting in Jerusalem contributed each an article toward an authentic, compendious, and unchangeable rule of faith, rests upon no historical evidence.

APOSTOLICI. **I.** A sect of the 2d century, mentioned by St. Augustine, concerning which very little is known. They considered marriage and individual possession of property mortal sins. **II.** A sect of the 12th century, mostly from the lower classes of society, who would not take an oath, nor shave, nor cut their hair, nor marry. Although their lives were blameless, many of them were executed at Cologne. **III.** A sect founded about 1260 by Gerard de Segarelli of Parma, a young man who had been rejected from the Franciscan order. They believed that the kingdom of heaven was soon to come, and went barefoot through Italy, Switzerland, and France, preaching, begging, and singing. They rejected marriage, but lived in intimacy with females whom they called spiritual sisters, and who accompanied them on their journeys. Segarelli was burned as a heretic in 1300. The sect existed a while longer under Dolcino, a Milanese, but soon became reduced to banditti, and after his execution in 1307 the movement ceased.

APOTHECARY (Lat. *apothecarius*, from Gr. ἀποθήκη, a shop or store), one who prepares and dispenses medicines. Apothecaries formerly sold herbs and drugs and spices, and by long practice in the art of preparing tinctures, sirups, powders, extracts, pills, and medicated waters, they became a special corporation, distinct from grocers and in some places from druggists, and were organized into a privileged body in the civilized parts of Europe, during the middle ages. In England the corporation still exists, in virtue of a royal charter, and with power to confer licenses on its members, who are invested with the right to administer medicine, as well as to prepare it and sell it in shops. A large proportion of the medical practitioners in England are only apothecaries; but the corporation enlarges its curriculum of studies and examinations as occasion may require. The royal college of surgeons in London also has a charter, and a right to give diplomas, which are honorary, and confer no legal right to practise medicine and to sue for payment. Most young apothecaries, however, now obtain them before they venture to practise as surgeons. In France the old corporation of apothecary druggists has been dissolved, and a new chartered corporation of *pharmaciens* has been substituted in its place. These keep shops, prepare medicines, and make up prescriptions, but have no legal right to practise as physicians. In the United States there is neither law nor custom to prevent an apothecary from practising as a physician. It is only lately that any legal restrictions have been placed upon the dispensing of the most powerful drugs by any boy whom the proprietor of an apothecary's shop might choose to employ.—In apothecaries' weight, used in dispensing medicines, the pound (℔) is divided into 12 ounces (℥), the ounce into 8 drams (ʒ), the dram into 3 scruples (℈), and the scruple into 20 grains (grs.). In the wholesale drug trade avoirdupois weight is used.

APPALACHEE BAY, a large open bay on the S. W. coast of Florida in the gulf of Mexico, having a breadth of about 45 m., and an extent inland of 18 m. There is a wide passage from the bay, 10 feet deep, leading to the town of St. Mark's, which furnishes excellent anchorage ground.

APPALACHEES, an Indian tribe of Florida, living on a bay which still bears their name. They were of the same family as the Choctaws, and were very numerous. They were at first not friendly to the Spaniards, and made war on them at intervals down to 1638. A Spanish post was established there, and missionaries soon won them over, care being taken to instruct the chiefs, many of whom learned to read and write. The oppression of the Spanish commanders led to a revolt about 1687; and the Spaniards after reducing them compelled many to work on the fortifications. Their appeal to the king in 1688, signed by the chiefs, is still extant. While this discontent prevailed, the English and their Indian allies invaded the country of the Appalachees, destroying many towns and killing or carrying off great numbers of the people. In 1704 St. Mark's was taken and the missionaries were put to death. The tribe was now reduced from 7,000 to about 400. On the settlement of Louisiana a portion removed to St. Louis in the vicinity of Mobile, while the Spaniards gathered the remainder at Soledad. After 1722 they disappear as a tribe, being probably absorbed in the Choctaw nation.

APPALACHIAN MOUNTAINS, the great range of mountains, called also the Alleghanies, which extends from that part of Canada lying between the New England states and the St. Lawrence river, through the whole length of Vermont, across the western part of Massachusetts and the middle Atlantic states, to the northern part of Alabama. The name Appalachian was given to the mountains by the Spaniards under De Soto, who derived it from the neighboring Indians. The name Alleghany, given by the English settlers of the north, was received from the Indians, and supposed to mean endless. The White mountains of New Hampshire and the Adirondack mountains of New York are really outliers of this range, though separated from it by wide tracts of low elevation. In their Alpine forms and more metamorphic structure, they present also features somewhat different from those which are especially peculiar to the Appalachian range. The Catskills form a link of the main range. These groups will all be found described under their own names. Not including the lateral ranges, the greatest width of the Appalachian chain is about 100 m. This is in Pennsylvania and Maryland, about midway of its course. Its extreme length is about 1,300 m. At either end its termination is not well defined, the mountains sinking away and being lost in the hilly country that succeeds to them, and at the south its gneissoid and other ancient rocks gradually disappearing beneath the cretaceous formations of this region. In all their extent the Appalachian mountains are remarkable, not for their great elevation, nor for their striking peaks, nor for any feature that distinguishes one portion of them from the rest, but for a singular uniformity of outline, particularly of that which defines the summit of the ridges, as well as that which marks their direction. While varying little in height, the ridges pursue a remarkably straight course, sometimes hardly diverging from a straight line for a distance of 50 or 60 m., and one ridge succeeding beyond another, all continuing the same general course in parallel lines, like successive waves of the sea. As one curves round into a new direction, all curve with it. Thus the valleys between the ridges preserve a uniform width, and are as remarkable for their parallelism as are the hills which bound them. An able paper upon "The Physical Structure of the Appalachian Chain" was read before the American association of geologists and naturalists in 1842, by the Profs. Rogers, who were at the head of the geological surveys of Pennsylvania and Virginia, and who had extended their observations into the continuations of the chain N. and S. from these states. This paper is still the most complete treatise upon this subject. Prof. Guyot has also given much attention to the physical structure of these mountains, and made careful barometrical measurements of several of their highest summits, both near their northern and southern extremities.—The general course of the Alleghanies is that of the coast line opposite to them. The sea makes its nearest approach to them at the mouth of the Hudson river, which is only 50 m. from the passage of this river through the Highlands. Thence as far S. as Cape Hatteras, the width of the Atlantic slope gradually increases, till the space between the coast and the Blue Ridge is about 200 m.; and so it continues to the southern extremity of the mountains. This space is a hilly district, gradually becoming of higher elevation as it extends back from the coast. In New England its average height at the base of the mountains is about 500 ft. above the sea; in Pennsylvania, 800; in Virginia, 500; and further S. 1,200. From the mountains to the lowest falls of the streams over the edge of the granitic platform, this is for the most part a region of the lowest stratified, metamorphic, and granitic rocks. These lowest falls mark the head of navigation of the streams, and the descent to the lower and more level platform of the upper secondary and tertiary formations, which in the southern states stretch along the coast in a belt sometimes reaching 100 m. in width. The eastern ridges of the chain, rising from their elevated base, do not present the appearance of the height above the sea which they actually reach; and on their western slope, which stretches far away toward the Mississippi, their height is still more completely lost in the elevated and wide-spread plateau. Between Lake Champlain and Lake Ontario, this western table land is 1,500 ft. above the sea, and from it as a base rise the high summits of the Adirondack mountains. In Virginia and Tennessee, as observed by Prof. Guyot, the bottom of the valley W. of the Alleghanies is from 1,000 to 2,000 ft. above the sea, and beyond it for 100 m. W. extends a plateau of 1,500 to 2,000 ft. elevation, traversed by longitudinal ridges. All the cross sections from the eastern edge of the granite present first the slightly undulating profile of the Atlantic slope, which is succeeded by the sudden rise to the highest elevation, and this by the wave-like descent and ascent across the valleys and the ridges, and finally terminate in the gradual descent on the western table land. As first pointed out by Prof. Rogers, the same law is found to obtain in this chain and in the Jura mountains, of steepest general slopes toward the east; but of individual ridges the gentler slopes are toward the east, and the steepest inclinations toward the west. In the mid-region of the chain—in New Jersey, Pennsylvania, and Maryland—where the breadth is greatest, the height appears to be correspondingly diminished. The summits, valleys, and table land all reach here their least elevation. The highest summits are but little over 2,000 ft. above the sea. Still the barrier between the eastern and western waters is complete; and no clean cut through the range is anywhere found, excepting that of the Mohawk river in New York, the highest elevation of which is only 400 ft. above the sea. Toward the north and the south from this central portion, the plateau becomes more elevated, as well as the summits that rise up from it. In North Carolina, near the borders of Tennessee, and in the northern part of Buncombe county, the base of the Black mountains, which have been an especial subject of examination by Prof. Guyot, is found to extend from 100 to 150 m. in length, with an elevation of 2,000 ft. Above this many summits are found reaching more than 4,500 ft. higher, as the Black Dome, the height of which above the sea is 6,760 ft.; the Balsam Cone, 6,668; the Black Brother, 6,671; Cat-tail peak, 6,595; Hairy Bear, 6,597, &c. The great elevation of this group makes it the culminating point of the system. Mt. Washington in New Hampshire, though found by the measurement of Prof. Guyot to be but 6,288 ft. above the sea, which measurement differs only three feet from that made by the officers of the coast survey, appears much more elevated than the summits of the Black mountains, from its rising from a plateau of not half the height of the base of this group.—In the southern part of Pennsylvania other parallel ridges succeed to the Alleghany mountains: Negro mountain, Laurel hill, and Chestnut ridge, each a repetition of the other, at distances about 10 m. apart, and each occupying nearly as great a breadth as the valleys which separate them. The capping of their summits is the conglomerate rocks, which underlie the coal measures. These strata arch over the crests of the ridges, projecting in bold cliffs, and on each slope dipping beneath the coal measures, which in the valley hills attain their greatest thickness. Thus the same strata appear upon the summits, and in undulating lines pass beneath the valleys to reappear upon the crest of the next ridge, and so on till, dipping down the western slope of Chestnut ridge, the coal measures spread in nearly horizontal strata over the western portion of Pennsylvania, Maryland, and Virginia. Their lowermost layers reappear as they rise to the surface upon the other margin of the great coal basin, as far into Ohio as Zanesville, and thence along a line extending to the mouth of the Scioto. In the gentleness of the dips of the strata, this western slope presents a striking contrast to the highly disturbed stratification of the Atlantic slope. There the rock formations, nearer the disturbing causes which have elevated the mountains and metamorphosed the rocks of the most eastern ridges, are thrown into confused and intricate positions, and pressed into folds and wrinkles, the prevailing inclination of which is toward the southeast—as horizontal layers of heavy cloth, pressed laterally by irresistible force from one end of the pile, would be lifted into folds, whose general inclination, by the falling back of the arches, would be toward the direction where the force is applied. The direction of the line of force is that of the ridges themselves, or rather of the anticlinal and synclinal axes, the one being the crest of wave-like form into which the strata are thrown, and the other the trough. This, too, is the line of the great fissures, which, now filled with metallic ores, constitute the mineral veins of the chain. It is the line of the rents caused by the earthquakes of the present period; and it is regarded by the Profs. Rogers as the line along which the elevating force that lifted the mountains extended, moving onward at right angles to this line, with a wave-like motion, till the result was attained of placing the ridges in their present positions. Toward the southeast, whence the movement proceeded, the axes are crowded near together. Toward the northwest they are repeated at distances gradually increasing, till the undulations at last flatten out and die away in the horizontally stratified regions of the west. The straightness or regular curvature of these axes, and their parallelism in distinct groups, continued for distances sometimes amounting to over 100 m., without change in the stratification or topography, cannot fail to excite the astonishment of the geological observer. Among these axes are particularly noticed by the Profs. Rogers the straight axis of Montour's ridge in the Susquehanna region, which extends about 80 m.; the beautifully inflected axis of Jack's mountain, in the Potomac region, 90 m. long; and that of the Knobly mountain, nearly a continuation of the last named, itself 100 m. long. In S. W. Virginia, the straight axis of Clinch mountain is traced for more than 120 m.—The strata of the Appalachian system are all of marine or terrestrial origin. The fossils they contain are all of families belonging to the salt water, or plants of terrestrial growth. The latest or uppermost groups are those of the coal formation. Throughout the whole chain none of the stratified rocks belong to a later epoch. Their elevation, then, must have taken place previously to those periods, when the upper secondary rocks, that lap upon the extreme eastern border of the Appalachian formations, were deposited, and previously to those still later periods when the great deposits of tertiary marls, sandstones, and clays were produced, which cover the S. E. part of our country. These mountains are then of much older date than the Alps or the Andes, upon the high summits of both of which rest the rocks of these later formations, containing their characteristic marine fossils. Raised probably by many successive impulses exerted on the same lines (it may be after long intervals of rest), the rush of the retreating waters appears to have opened those gaps through the ridges, which constitute a peculiar and most interesting feature in the topography and scenery of these mountains, and which could not have been produced by the action of any existing streams. The same rush of waters, acting upon piles of strata of various degrees of hardness, and consequent capacities of resistance, impressed upon these the forms appropriate to these properties. This is seen in the sharp outline of single beds of sandstone, which project from the sides of the hill, around which they outcrop; and in the receding of the profile of the mountain against the beds of softer shales and slates. It is seen on a grander scale in the peculiar forms which each of the rock formations gives to the hills or mountains it composes, and which enables one to recognize it wherever met with by a glance at the topography.—The regular arrangement of the rock formations throughout all their foldings and undulations is rarely disturbed by any of those sudden breaks which are common in other countries, and which bring into contact, by the displacement of portions of the series, strata usually far separated from each other. These "faults," however, are met with in several of the states, but particularly in S. W. Virginia, where they extend for about 100 m. in length, their course being the same as that of the anticlinal axes out of which they grow. They appear to have resulted from the lateral thrust toward the northwest of the folded piles of strata. They are observed, always beginning on the N. W. side of the anticlinal axes, in tracing these along their course, the strata on this side becoming steeper and steeper, till at last they are inverted, and dip toward the southeast. At this point the strata appear to have burst asunder along the line of greatest curvature, and the S. E. portion to have been lifted up, bringing its lower strata against the higher members on the other side of the line of fracture. The depth of this dislocation, or the extent of the displacement, increases toward the centre of the line of fault; and where the length of this line, as in the district under consideration, stretches along for 100 m. or more, it cannot appear disproportional that the vertical displacement should in its central portions amount to $\frac{1}{20}$ of this distance; and that the lower groups of the Appalachian system, usually separated by intervening strata of four or five miles in thickness, should be brought in contact, so that the edges of one series abut against the edges of the other. Thus the lower limestones of the great valley of Virginia are seen in Montgomery county, and thence westward along the line of the Virginia and Tennessee railroad, in vertical position, with the strata of the far more elevated series containing coal beds dipping toward them, as if the more recent formations passed beneath these ancient groups. The thermal springs, which are of frequent occurrence along the Appalachian chain, and particularly so in Virginia, flow out almost universally on the lines of anticlinal axes, or of the faults. Their elevated temperature indicates the great depths from which they rise, and consequently that to which the folds and fractures of the stratification reach. —The geological formations of the Appalachian belt, comprising all the groups from the granite to the coal, are abundantly productive in the most important ores and minerals, which especially belong to these different formations. In the ancient granitic rocks which skirt the edge of the lower stratified formations, and sometimes spread out over broad areas, as in the mountainous region W. of Lake Champlain, in the highlands of New York and New Jersey, are found inexhaustible repositories of magnetic iron ores, which already are worked to great extent in connection with the valuable beds of hematite ores that are found conveniently near them, ranging from Canada to Alabama along the line of the great Appalachian valley. These beds occur in great depressions in the lower limestones and metamorphic slates of this range, and sometimes in veins in the same rocks, and are worked in every one of the states through which this passes, everywhere presenting the same peculiar features. They are frequently of extraordinary extent, and though worked in several instances for more than 100 years, the actual depth to which they reach, and their real nature, have never been fully explored. Together with the magnetic ores, they furnish the supplies for a very large proportion of all the iron manufactured in the United States; and the numerous bodies of them still untouched are a provision for still larger demands for generations to come. The value of these repositories can hardly be overestimated, particularly when considered in connection with the long extent of their range, not far back from the coast, and the enormous supplies of mineral coal that can be conveniently brought to effect their reduction. Far more valuable are they than the gold found in the granitic and metamorphic rocks of the eastern ranges, though this, judging from the production of certain localities in the southern states, would, if exposed by the great irregularities of the surface, like those of California, be found as rich and abundant as there. It is worked in alluvial deposits enriched from the auriferous veins; and these also contain ores of copper and lead, and occasionally of silver. These deposits and veins are met with in the valley of the Chaudière below Quebec, and are again seen in a few localities in Vermont; but their great development is on the eastern borders of the Appalachians S. of the Potomac. The copper ores met with in the rocks of the Appalachian system have never proved of great importance. They are found along the range of the talcose and micaceous slates of the Blue Ridge, as well as associated with the gold further toward the southeast. In Virginia these slates produce some workable beds of lead ore, and display occasionally attractive appearances of copper. In New Jersey the same range produces the remarkable red oxides of zinc associated with Franklinite, which are worked together, the one to produce the white zinc paint, and the other a superior quality of iron for the manufacture of steel. Further S. along the same belt are found, in the Lehigh valley and in Lancaster county, Pa., the valuable silicates and carbonates of zinc, called calamine, which are worked for the same purpose as the red oxides of New Jersey. Veins of lead ore are found in several of the formations; and in Wythe county in S. W. Virginia a mine in the great limestone formation has been worked with some interruptions for more than 100 years. These lead veins, however, of the lower members of the Appalachian system, have for the most part proved of little importance; indeed, throughout the range of the mountains none of the formations above the metamorphic rocks are rich in any other metallic ores than the hematites which are occasionally met with, the red fossiliferous iron ores of Formation No. V. of the Pennsylvanian survey, called in New York the Clinton group, and the argillaceous ores of the coal measures. No rock formation is more useful to man for the variety and value of its productions than the true coal formation. It furnishes the great supplies of anthracite and bituminous coal, beds of fire clay, and west of the Alleghany ridge abundant beds of limestone. Salt water is obtained by boring artesian wells to lower members of the series, and the brine flows up or is pumped up into the valleys, to be evaporated by the combustion of the coal found in the neighboring hills. In many localities, where the salt-bearing rocks approach the surface, the brine is more readily obtained in large quantities, and the coal is transported for its evaporation. The formations that furnish the salt also contain great beds of gypsum. Onondaga county in New York is famous for these productions, and in Washington county in S. W. Virginia solid beds of salt are struck in the midst of the most extensive plaster deposits. —From one extremity of their range to the other, the Alleghanies have furnished large supplies of the valuable white pine; and many of the less accessible districts of the belt still abound with it. Far toward the north, upon the better soils of the mountains, the hard-wood forests prevail—the fine sugar maple, of the curly and bird's-eye varieties, and the white birch. The ash and the beech also attain their highest state of perfection in the most fertile soil of these northern mountains. Upon the poorer lands, and along the ravines of the mountains, the "black growth" flourishes—the evergreens, as the different species of the pine family, the spruce, the hemlock, cedar, and balsam fir; and in the swamps, the hackmatack or larch. The varieties of the oak appear further S. upon the range, these and the chestnut taking the place of the maple, birch, and beech, and, to some extent, of the evergreens also. The large cherry tree, so valuable for its timber, is met with in Pennsylvania, scattered upon the mountains; in W. and S. W. Virginia it forms forests of itself. The white oak, the white poplar, the white and yellow pines, and the chestnut are the valuable forest trees of the mountains of Virginia. In some localities still further south, the dark growth of the coniferæ covers the summits, as found, for instance, by Prof. Guyot in the group in North Carolina named the Black mountains from the dark foliage of its balsam firs, spruce, and hemlock. Among the flowering shrubs, none are more beautiful than the varieties of kalmia, azalea, and rhododendron, which are found in the greatest profusion upon the slopes of the Alleghanies and along their watercourses, giving to the rough places of the mountains the rich colors of cultivated gardens.

APPALACHICOLA. I. A river of W. Florida, formed by the union of the Chattahoochee and Flint rivers at the S. W. angle of Georgia, flows S. about 75 m. into St. George's sound, through an estuary called Appalachicola bay. It is navigable for steamboats through its whole course, and with its branches is supposed to drain not far from 20,000 sq. m. The tide runs up 60 m. **II.** A town and port of entry, capital of Franklin county, Fla., situated on a bluff at the mouth of the preceding river, 65 m. S.W. of Tallahassee; pop. in 1870, 1,129; in 1860, 1,904. Large quantities of cotton are shipped here by steamboats. In 1870 the number of vessels registered, enrolled, and licensed was 21, with an aggregate tonnage of 2,033 tons; of these 7 were steamers with a tonnage of 1,587 tons.

APPANOOSE, a S. county of Iowa, adjoining Missouri; area, 510 sq. m.; pop. in 1870, 16,456. The North Missouri railroad traverses it. The river Chariton, which flows through it, and numerous smaller streams, furnish ample water power, while the rolling prairies which cover a large part of the surface are fertile, and the watercourses are bordered by tracts of timber. Large beds of coal have been found at several points. In 1870 the county produced 134,411 bushels of wheat, 986,280 of corn, 322,256 of oats, 59,079 of potatoes, 83,784 lbs. of wool, 484,147 of butter, 22,659 tons of hay, and 37,150 gallons of sorghum molasses. Capital, Centreville.

APPARATUS, in physiology, a group or collection of different organs, which are associated in the performance of some function in which each one bears a particular part. Thus, the heart, arteries, veins, and capillaries together constitute the circulatory apparatus. The bones, ligaments, tendons, and muscles of the limbs form the apparatus of locomotion. The mouth, teeth, tongue, stomach, and intestine, with the accessory glandular organs, are the digestive apparatus. An apparatus may include not only different organs, but also entire systems. Thus the circulatory apparatus comprises not only the heart, which is an organ by itself, but also the arterial system, the venous system, and the capillary system. All of these, however, are essential to the circulation of the blood, and each performs its own special part in the function.

APPARITION, a spectral illusion, by which imaginary objects are presented to the senses with such vividness that they are believed to be real. This form of illusion, the result of some abnormal state of the brain, concerning which medical science has given thus far only incomplete information, has been the cause of much superstition. The apparitions seen in actual delirium, or by those obviously insane, do not of course fall within the scope of this article; and the well authenticated instances in which apparitions have been seen by men of ordinarily clear intellect, and apparently in their customary good health, are so mingled with impostures and exaggerations that it is difficult to make them the ground of scientific investigation. But there are some cases where men of the highest intellectual power have had this cerebral affection, yet have retained enough acuteness of observation to investigate their own disease, and describe the apparitions coolly and accurately, though knowing them to be illusory. The most noteworthy of these cases is that of Nicolai, an eminent publisher in Berlin, who in 1791 was for some months constantly subject to spectral illusions, which presented to him the figures of friends, unknown persons, and singular animals, which accompanied him everywhere, went through all the movements belonging to their real prototypes, and even spoke to him. Conscious of their character, he observed them so accurately as to be able to write a scientific paper upon them for the philosophical society of Berlin. He was ultimately cured by blood-letting. Many similar instances are recorded in the volumes referred to at the close of this article.—Some well authenticated accounts of apparitions appearing to persons a short time before death do not in the present state of medical inquiry admit of so satisfactory an explanation. That both the apparitions actually seen and those in which the superstitious believe should most frequently represent the forms of dead friends, is conceded to be natural; for the brains of those who see or fancy they see them are generally excited by grief or filled with morbid fears of death. Yet these causes, and the natural tendencies of superstitious minds and low states of knowledge, gave rise to the popular belief in ghosts.—See Dr. John Ferriar's "Essay toward a Theory of Apparitions" (London, 1813); Dr. Samuel Hibbert's "Sketches of the Philosophy of Apparitions" (Edinburgh, 1824); Sir Walter Scott's "Letters on Demonology and Witchcraft" (Edinburgh, 1830); Mrs. Crowe's "Night Side of Nature" (London, 1848); Jung Stilling's *Geisterkunde*, translated into English under the title "Pneumatology" (New York, 1851); Dr. Brierre de Boismont's "Hallucinations, or the Rational Theory of Apparitions," &c. (English translation, Philadelphia, 1858); Robert Dale Owen's "Footfalls on the Boundary of Another World" (Philadelphia, 1860), and his "Debatable Land" (New York, 1872). See also, in this work, DEMONOLOGY, SPIRITUALISM, and WITCHCRAFT.

APPEAL, in law, the proceeding by which a decision of a court or judge is taken to a superior tribunal for review. Though appeal is commonly used in the law to describe all revisory proceedings, yet the word strictly belongs to that remedy of the civil law which takes up the whole cause to the higher court and subjects facts as well as law to review. At common law an appellate court takes cognizance characteristically only of matters of law. Matters of fact in that system can be revised only upon a new trial. For example, if a party in a suit conceives that a verdict against him is not sustained by the evidence, he applies to the court where the case was tried for a new trial. Upon an appeal from the decision on that motion, the appellate court may or may not sustain it; but if it does not, it will not itself pronounce a verdict on the facts, but remits the cause to the lower court, to be tried there again by a jury.—The review upon points of law is had at common law upon a writ of error, while the appeal is used in courts which follow the practice of the civil law. The distinction between the two modes of review is now abolished in many of our states, but it still remains in the procedure of our federal courts. In admiralty and equity causes in those courts, matters of fact as well as of law are ordinarily tried in the first instance by a judge without a jury; and appeals from sentences or decrees in such causes carry up the whole case, and the appellate court passes upon the questions of fact and of law alike. But common law causes—the ordinary issues, for example, which are tried with a jury—go up to the appellate court upon a writ of error, and are revised there only in matters of law.—The proceedings upon appeal are in all our states regulated by statutes. Indeed, without some such authority the right of appeal does not exist at all. The subject of appeal is ordinarily the final judgment or action of the inferior court, and it must be the final decision upon the substantial matter and merits of the cause. Orders of the court upon mere points of practice in the progress of the action, which do not involve its merits, or which rest in the pure discretion of the court below, are not subjects of review. But a plain abuse of judicial discretion, or a clear mistake in exercising it, may give good grounds for appeal; and so may the refusal of the court below to exercise a discretionary power on the mistaken ground that it did not possess it. A party cannot appeal from a judgment entered against him on his default or consent, nor from his own judgment of nonsuit, nor where he has agreed that the judgment of the lower court shall be final. The right to appeal may also be lost by taking proceedings on the footing of the decision, and especially by accepting any benefit under it. Properly, only a party to the record may appeal, and he only when he is aggrieved or injured by the decision; but he may be injured by a judgment, even in his favor, which is less favorable to him than he is entitled to, and in such a case he may appeal. A party to the record loses his right of appeal when he ceases to have any interest in the subject of the suit. If a party to the record dies, the right of appeal does not exist in his legal representative until he is substituted as a party in the action.—When the matter comes before the appellate court, the presumption is in favor of the judgment below, and the question is whether for any cause the judgment shall be reversed. Unless there is a majority or other controlling vote for reversal, the judgment stands affirmed of course. As the appellate court is inclined to sustain the decision of the court below unless there is clear reason for reversing it, it will not look into any part of the judgment which is not appealed from, nor take notice of any defects or insufficiencies in the proceedings below, unless they were formally objected to there—unless, indeed, the insufficiencies not objected to could not have been cured by the opposite party below if the objection had been stated; and even a ruling to which the appellant did object, but which has done him no substantial harm, will not be noticed. An erroneous charge of the judge below which is wholly extraneous and immaterial is no ground for reversal; nor will a verdict be set aside for misdirection of a judge, if the court can see from the whole evidence that the result would have been the same, if the objectionable instruction had not been given, or when the whole evidence justifies the verdict. If a judgment is right in point of law, it is no reason for reversing it that it cannot be sustained on the ground on which the court below proceeded.—When the appeal brings up questions as to the sufficiency of the evidence to support a verdict, an appellate court is disinclined to disturb the finding of the jury unless it is clearly and certainly against the weight of the evidence, the theory of our law being that the jury is the best tribunal for deciding all matters of fact. The same principle applies to findings by referees or by judges trying causes without juries; and in such cases, especially when the evidence was conflicting, the conclusions as to facts will not ordinarily be reversed.—In all our states the statutes will be found to contain provisions relating to the conditions of appeals, namely, in respect to the time within which they must be taken, the security which must be given, and the effect of the appeal in staying proceedings on the judgment appealed from. As to the time for taking the appeal, if it is prescribed by statute, it cannot be extended by the court; and if an appeal is not taken within the limit, it is lost. Ordinarily, the appellant does not secure his right of appeal until he gives a bond or some such undertaking for costs; and he does not stay execution on the judgment against him unless he gives a like security for the payment of the amount of it in case it is affirmed.—With respect to criminal cases, the statutes of most of the states provide for reviews of verdicts upon writs of error at the instance of the convicted party. But there is ordinarily no appeal or remedy of that sort allowed to the people to reverse a judgment of acquittal. The constitution of the United States provides that no person shall be subject for the same offence to be twice put in jeopardy of life or limb, and no state can by any statutory provision take away from a criminal the benefit of this provision. Whenever statutes give any right to the state to have a review of a criminal trial, they must be construed with regard to the constitutional prohibition.—The supreme court of the United States exercises an appellate jurisdiction over the state courts, where the validity of a treaty or statute of, or authority exercised under, the United States is drawn in question, and the decision is against that validity; or where the validity of any state authority is drawn in question on the ground of its repugnancy to the constitution, treaties, or laws of the United States, and the decision is in favor of its validity; or where a question of construction upon the constitution, a treaty, or a statute of the United States arises, and the decision is against the claim under the authority of either. All civil causes, where the amount involved is sufficient, may be carried on appeal from the United States district court to the circuit court, and thence to the supreme court. The circuit courts exercise an appellate jurisdiction over all cases brought in the district courts, except where the matter in controversy is of a very small pecuniary value. Another mode of review in the supreme court is that upon a case certified from a circuit court. As this court may consist of two judges, they may, when they fail to agree, certify to the supreme court that they are divided in opinion, and in that event the case is entertained by the higher tribunal as upon an appeal. (See COURTS OF THE UNITED STATES.)—In New York the court of appeals is a court of appellate jurisdiction only. It has been lately reorganized under an amendment to the Constitution adopted in 1869. The amendment provides that the court shall consist of a chief justice and six associate judges, to be chosen by the electors of the state, and to hold office for 14 years. Five members of the court constitute a quorum, and the concurrence of four is essential to a decision. The present court has all the powers and jurisdiction which were possessed by the late court of appeals, which it displaced. It has exclusive jurisdiction to review upon appeal any actual determination made at a general term by the supreme court, by the superior courts of New York and Buffalo, and by the court of common pleas of the city of New York in certain specified cases, among which the more important are the following: Upon appeal from a decision of any of these courts on final judgments in an action brought originally in it or removed into it from another court, it may reverse, affirm, or modify such judgment, or review any order in the case which involved the merits. The court also entertains appeals from orders affecting substantial rights when they in effect determine the action and prevent judgments from which appeals might be taken; or when such orders discontinue actions, or grant or refuse new trials, or strike out pleadings. But no appeal lies to the court of appeals from an order granting a new trial on a case or exceptions, unless the appellant with his notice of appeal gives also a consent that if the order appealed from be affirmed, absolute and final judgment may be forthwith entered against him. When the decision of any motion at a special term of the supreme court involves or is rested upon the constitutionality of any law of the state, an appeal may be taken first to the general term of that court, and thence to the court of appeals. No appeal to this court stays execution on a judgment unless it is accompanied with a bond securing payment of the judgment upon an affirmance or a dismissal of the appeal.—In England, the appellate jurisdiction of the court of chancery, where equity causes are heard originally by the master of the rolls or by the vice chancellors, is exercised by the lord chancellor alone, or sitting with one or both of the lords justices, or by these two alone. With respect to appeals in civil causes tried in either of the three superior courts (queen's bench, common pleas, and exchequer), the first appeal lies to the court of exchequer chamber, where the causes coming from either of the three are heard by the judges of the other two. In criminal cases appeals on questions of law arising in the courts of oyer and terminer or quarter sessions may go through the queen's bench to the exchequer chamber, but they are usually taken directly to the court for crown cases reserved. This latter court was created in 1848, and is composed of the judges of the three superior courts. It has final authority on questions raised by evidence, or in arrest of judgment; but on more important questions, like demurrers to indictments, the appellant may go through the queen's bench to the exchequer chamber, and thence to the house of lords. The house of lords is the supreme appellate judicature of the realm. By its ancient jurisdiction it reviews all errors brought up through the exchequer chamber from the common law courts of England and Ireland, and under more recent authority it entertains appeals from judgments of Scotch courts on questions of law. The house of lords also takes cognizance upon appeals of errors in criminal causes from all the inferior jurisdictions, except where the court for crown cases reserved has the final decision; and in chancery cases it hears appeals from all the English and Irish equity courts. By recent statutes appeals may also be taken to the house of lords from the probate courts of England and Ireland. There have been lately some emphatic complaints made about the weakness of the house of lords as an appellate court. Its decisions upon appeals are practically left entirely to the law lords, and it has not unfrequently happened that two or three of these have reversed judgments which had been sustained by a majority of the judges of the courts below. In one case of a recent date the prevailing judgment of the house of lords, given in fact by two persons only, coincided with the opinion of only four judges below, while the defeated party had had altogether seven judges in his favor. In another case the party who succeeded in the house of lords had had in the course of the suit through all the courts only four judges in all in his favor, while his opponent had had eight. Another supreme appellate tribunal is that of the queen in council. The judicial functions of the crown are however in fact delegated to the judicial committee of the privy council. This court revises judgments of the colonial courts throughout the empire, and sentences of the ecclesiastical and admiralty courts. The committee after consideration make their report to the crown, and its approval is signified by an order in council.—In France, incorrect decisions are also held in check by a system of appeals. The first regularly organized tribunals of appeal in France were about the reign of Louis IX. The French right of appeal, especially in criminal cases, seems to American or English observers to be often frivolously exercised. The French courts of appeal may discharge or amend the judgments of the courts below, and may reduce or increase punishments or the pecuniary awards of juries. The theory of the French appeal seems to be a submission of the facts as stated in the proceedings to the court of appeal, to whose judgment all deductions whatsoever are referred. Appeals from justices of the peace lie to the tribunals of first instance, composed of from three to twelve judges, divided into chambers of civil and criminal jurisdiction. The decisions of these tribunals and of the tribunals of commerce are reviewed in 27 higher courts, taking their names from the cities where they are established. Each of these courts is composed of at least 24 judges, and is usually divided into three chambers, one having cognizance of civil causes, one of criminal accusations, and one of police matters. In the civil chambers seven judges, and in the chamber of criminal accusations five judges must concur. On very important or difficult questions two of the chambers combine, and the decision must be concurred in by 14 judges. Appeals from these courts go to the court of cassation. This court has 49 judges, and may on appeal annul the judgments of any of the inferior courts for any error of law apparent on the face of the proceedings. No new evidence is received in this court, while on appeals from the courts of first instance the proofs may be changed to any extent.—In Germany, the system of appeal was commenced in 1496, and is now greatly elaborated; the courts are of the first, second, and third instance. The appeals may be based either on matters of law or fact. Each kingdom has its own tribunals, and the smaller principalities are associated together in districts for the purposes of courts of appeal. The proceedings of the German courts, like those of the English court of chancery, are excessively prolix and tedious, and entirely in writing, the arguments only being oral, and their essence being contained in the pleadings, as deductions from the facts.—Besides the sense in which we in modern parlance use the word appeal, proceedings of historical interest known as appeals were formerly recognized in English law, wherein the term was used as derived from the French *appeler*, to summon or to challenge. An offender on his trial might by permission of the court confess the charge, and "appeal" another person as the instigator or accomplice of his crime, who thereupon might be put on his trial, or fight his accuser. If he was acquitted, or if he conquered, the accuser was hanged on his own confession; if convicted or vanquished, the accuser was pardoned, as for service done to the state. Sir Matthew Hale denounced this practice, and it fell into disuse, although by various statutes now repealed the indemnity, and even the reward of approvers, was long maintained. A party injured by a felony, his widow or heirs, might also appeal the offender for the price of blood, and subsequently for the purpose of punishment. This was distinct from a crown prosecution. The appellee, the person accused, could then demand his wager of battle, which the accuser, if a peer, a citizen of London, the widow, a priest, an infant, or person above 60, might decline. The appellant might also decline to fight if the evidence which he adduced raised a very violent presumption of the guilt of the appellee. The combat commenced by the appellee throwing down his glove, which was lifted by the appellant, whereupon each party affirmed categorically by an oath the truth of the accusation and denial, concluding, "and this I will prove against thee by my body." Thereupon the parties must proceed to fight, with club and buckler, in the presence of the court, from sunrise to the appearance of the stars in the evening. If the appellant was vanquished, the appellee was acquitted, and had his action against the appellant, who was thereupon declared infamous; if the appellee was vanquished, he was hanged forthwith. The last occasion on which the appeal of felony and wager of battle were resorted to in England was no longer ago than the year 1818, when the defendant was charged on such an appeal with the rape and murder of the appellant's sister. The appellee waged his battle, whereupon the appellant claimed that the evidence which he offered of the guilt of the accused was so conclusive as to exempt him, the appellant, from the necessity of fighting. But the judges decided that the evidence was insufficient to sustain the claim, though they offered to consider the point whether the wager of battle had not been waived by the form of the pleadings. But the appeal was withdrawn, and the accused was thereupon discharged. In the next year, 59 George III., the wager of battle was abolished by parliament. The case here referred to (Ashford v. Thornton) is reported at great length in 1 Barnewall and Alderson's Reports, p. 405, where, in the elaborate arguments of counsel and in the opinions of the judges, will be found interesting matter upon this now obsolete topic of the law.

APPENZELL, a N. E. canton of Switzerland, entirely surrounded by the canton of St. Gall; area, 163 sq. m.; pop. in 1870, 60,639. The surface is irregular and hilly, but there are no considerable mountains, except the picturesque range of the Sentis on the southern border. Offshoots of the Alps form parts of the eastern and western boundaries of the canton. The principal stream is the Sitter, a tributary of the Thur. Since 1597 the canton has been divided, by an agreement of the inhabitants, into two independent half-cantons, each containing a certain number of Rhoden (a Swiss word for communes or parishes). The northern and Protestant division, called Outer Rhodes (*Ausserrhoden*), contains about 100 sq. m. and 48,726 inhabitants, who carry on a considerable commerce, and manufacture cotton, linen, and silks, their silk-weaving and silk embroidery being among the most beautiful work of the kind in Europe. The southern and Roman Catholic division, called Inner Rhodes (*Innerrhoden*), contains about 63 sq. m. and 11,913 inhabitants, who devote themselves almost entirely to raising cattle, making butter and cheese, and other pastoral industries. Outer Rhodes sends two members to the federal council, and Inner Rhodes one. The capital of Inner Rhodes is Appenzell, a scattered village 6 m. S. by E. of St. Gall; of Outer Rhodes, Trogen. The inhabitants of both divisions are intelligent and quick of wit to a degree that has given them a celebrity throughout Switzerland; their habits are simple; they are fond of athletic exercises, and are excellent wrestlers and marksmen.—The canton belonged in the 8th century to the Helvetian dominions of the Frankish kings, and shared their fortunes, until in 1292 it was placed by Adolphus of Nassau under the control of the abbey of St. Gall, which had been founded in 720, and had always exercised great authority in its affairs. In consequence of the oppressions of the abbots, a rebellion broke out in 1401, and was renewed at intervals for 50 years, finally resulting in the independence of the people. In 1452 the district joined seven other cantons for the sake of greater safety, and in 1513 it was received as a canton of the Swiss confederation. It derived its name from the monastery of Abbatis Cella, established by the monks of the abbey of St. Gall.

APPERLEY, Charles James, an English sporting writer, born in Denbighshire in 1777, died in London, May 19, 1843. After serving for a short time in a cavalry regiment, he began contributing under the name of "Nimrod" a series of articles to "The Sporting Magazine," which through his contributions soon doubled its circulation. The proprietor paid him a handsome annual salary and kept a stud of hunters for his use. His habits were expensive, however, and after the death of this liberal publisher, Mr. Pittman, the new owners of the magazine brought suit to recover moneys advanced; and to escape them "Nimrod" in 1830 established himself in a château near Calais. At the request of Lockhart he wrote for "The Quarterly Review" in 1827 some excellent papers, which were afterward collected under the title of "The Chase, the Turf, and the Road." Among his other works are: "Hunting Reminiscences," "Life of a Sportsman," "Nimrod Abroad," "Remarks on the Choice of Horses," and "Treatise on the Horse and Hound." His method of summering horses without throwing them out of condition is now generally adopted in England for hunters. It consists in feeding them on green food, in large loose boxes, on clay floors, their shoes being taken off, and their systems lowered by gentle alteratives, instead of the old method of turning them out to grass.

APPERT, Benjamin Nicolas Marie, a French philanthropist, born in Paris in 1797. At the age of 18 he formed the idea of establishing schools for mutual instruction in the department of Le Nord, and applied the principle in the following year to military organizations, with such success that Marshal Gouvion St. Cyr, minister of war, in 1818 appointed him professor of a normal school for officers and non-commissioned officers in Paris. Within three months 163 of these schools, with 20,000 pupils, were in full operation, and in the course of two years 100,000 soldiers had reaped the benefits of them. In 1822 he was imprisoned on a charge of favoring the escape of two political convicts. After his release he devoted several years to the improvement of the condition of prisons, and published a monthly *Journal des prisons* (1825–'30). After the revolution of 1830 he became the queen's almoner and secretary general of the society of Christian morality. He was the author of several works on bagnios, prisons, criminals, and prison education, and a series of *Voyages* in various European countries for examination of their prisons.

APPETITE (Lat. *appetere*, to desire or seek earnestly), in physiology, the natural desire and relish for nutritious food. The desire for food returns, in man and animals, with a certain degree of regularity, at periodical intervals. This is owing to the continuous alteration and waste of the ingredients of the animal tissues and fluids by the active powers of life, and is an indication that the time has arrived for the ingestion of food to reëstablish the equilibrium between nourishment and disintegration, and thus maintain the integrity of the vital powers. The healthy appetite, in persons taking a proper amount of exercise, is the best guide for determining the frequency with which food should be taken, as well as for its quantity, and the kind of food consumed. If not satisfied within a reasonable time, the appetite becomes at first imperative and distressing, and is then apt to fail altogether; so that the desire for food disappears until the next recurrence of its habitual period of return. A morbid appetite, or a craving for food in unnatural quantity or of unnatural character, is sometimes a well marked symptom of disease.

APPIAN (Lat. *Appianus*), a Greek historian of the 2d century, born at Alexandria in Egypt. He removed to Rome in the reign of Trajan, and continued there under Hadrian and Antoninus Pius. He was by profession an advocate, and at Rome filled the office of procurator, and had charge of the imperial treasury. He wrote a Roman history in 24 books. Eleven books of this history, together with some fragments, have come down to us. His style is unaffected, and his work, though disfigured by blunders, is highly important as a repertory of information. The best edition of his remains is that of Schweighäuser (3 vols. 8vo, Leipsic, 1785).

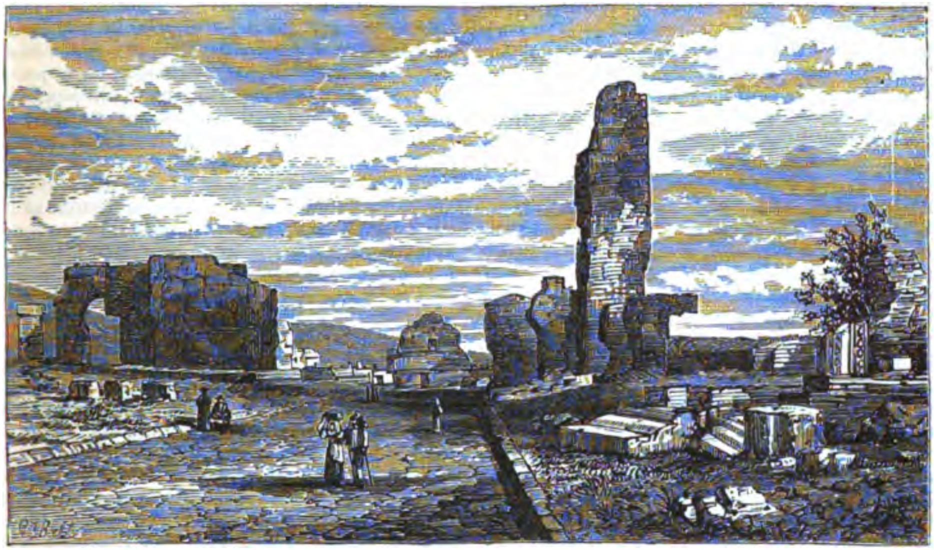
APPIANI, Andrea, an Italian painter, born at Bosisio, near Milan, in 1754, died in 1817 or 1818. His best works are frescoes in the palace at Milan and the cupola of Santa Maria di San Celso. "Apollo and the Muses" in the Villa Bonaparte is also an admirable specimen of his style. Napoleon and most of the members of the imperial family sat to him for their portraits. An attack of apoplexy in 1813 rendered him so helpless that he was obliged to sell his drawings and other valuables, and he died in poverty.

APPIANO, the name of an Italian family which ruled over Pisa and Piombino from the 14th to the 17th century. **I. Jacopo I.,** the founder of the family, died Sept. 5, 1398. Having attached himself to the Ghibelline party, he conspired with Galeazzo Visconti, sovereign of Milan, excited in 1392 a commotion in the streets of Pisa, during which he effected the massacre of the chief magistrate, Pietro Gambacorti, and his two sons, and in the midst of the popular consternation assumed the title of sovereign of Pisa. **II. Gherardo,** son and successor of the preceding, sold Pisa to Visconti, duke of Milan, for 200,000 florins, reserving to himself only the sovereignty of Piombino and the isle of Elba, whither he withdrew in 1399. His descendants of the male line preserved for two centuries the principality of Piombino, after which it was surrendered in 1631 by the emperor Ferdinand II. to Philip IV. of Spain. **III. Jacopo III.,** ruler of Piombino, died in 1474. A conspiracy against him, aided by Galeazzo Maria Sforza, duke of Milan, proved unsuccessful, but Jacopo was obliged to place himself under the protection of Ferdinand, king of Naples. He consented to receive a Neapolitan garrison in Piombino, and in return was permitted to join to his own name that of Aragona. **IV. Jacopo IV.,** son of the preceding, sovereign of Piombino, died in 1511. He married a daughter of the king of Naples, and took a command in the army directed by that prince and by Sixtus IV. against Lorenzo de' Medici. He was taken prisoner by the Florentines and obliged to pay a ransom for his liberty. In 1501 Cæsar Borgia took possession of Piombino, but Jacopo was restored by an insurrection of the people.

APPIAN WAY (Lat. *Via Appia*), a celebrated road which with its branches connected Rome with all parts of southern Italy. The main road was laid out as far as Capua by Appius Claudius Cæcus (312–307 B. C.), and was subsequently continued to Brundusium. It was remarkable for its substantial pavement of large and well fitting blocks, and was the most picturesque of all the approaches to Rome. Numerous magnificent sepulchres lined the road, the most memorable of which were those of Calatinus and the Scipios. Until about 20 years ago, the greater part of the road beyond the tomb of Cæcilia Metella, or between the 3d and 11th milestones, was hardly distinguishable from the surrounding campagna, excepting by the ruins of sepulchres; but excavations in 1850–'53, extending over the Appian way from its beginning at the Capena gate as far as the ancient site of Bovillæ, have reopened an interesting part of the road. Canina, who carried out this work under the auspices of the papal government, describes these discoveries in *La prima parte della Via Appia dalla porta Capena a Boville* (2 vols., Rome, 1851–'3). The restoration of the ancient road is called the *Via Appia Nova*, and passes in a straight line through Albano until it reaches the viaduct, completed in 1853, which spans a deep ravine between Albano and Aricia. The railway from Rome to Naples crosses the Appian way near the 11th milestone.

APPIUS CLAUDIUS. See CLAUDIUS.

APPLE, the fruit of *pyrus malus*, of the natural order *rosaceæ*. Although the apple is mentioned in the Bible, and by Theophrastus, Herodotus, and other ancient writers, it is probable that other fruits were designated by that name. Even now the word apple is used to designate a fleshy fruit, as the love-apple (tomato), pine-apple, rose-apple (*myrtaceæ*). The derivation of the word is curious. Anglo-Saxon *apl* (German, *Apfel*), one of the few names of our common fruits



The Appian Way. (See p. 598.)

not derived from the Latin or French, is, according to Dr. Prior, of common origin with the Zend and Sanskrit *ab* or *ap*, water, and *p'hala*, fruit. The Latin *pomum*, from the root *po*, to drink, would also signify "a watery fruit." Whatever be the parent country of the apple, it was doubtless of eastern origin. Pliny mentions the crab and wild apples as small and sour, so sour "as to take the edge from off a knife;" but some, he says, are remarkable for their "fine flavor and the pungency of their smell." Many varieties were cultivated about Rome, and they usually bore the names of those who originated them or grafted them. More than 20 sorts are mentioned by Pliny, but none of these, if in existence now, can be identified from his brief and imperfect description. Probably the Romans introduced the apple into England as well as the pear, but the early chronicles are silent as to its subsequent history in that country until after the establishment of Christianity, when the monks and heads of religious houses planted orchards, and henceforth the fruit became common. The early settlers of America brought apple trees, and an island in Boston harbor where they were planted still bears their name. The Indians helped to spread the fruit through the country, and "Indian orchards" are common throughout New England. —Whether in the wild state or cultivated, the apple is by no means a handsome tree. The stem is slow-growing, low-branching, with rigid, irregular branches, in many varieties pendent to the ground; the bark after the tree has passed its early youth becomes rough and scaly; the diameter of the head is usually greater than its height, which seldom exceeds 30 feet; the leaves are broad, tough, and rigid, those of sweet-fruited trees being usually of a darker green; the blossoms are generally tinged with red and are sweet-scented; the fruit is more or less depressed at the insertion of the peduncle; woody threads (10) pass through the fruit, being regularly disposed around the 2–5 carpels, which contain two seeds each. The apple tree is very tenacious of life, many specimens bearing fruit in this country at an age of nearly 200 years, and the best artificial varieties last from 50 to 80 years. Various species of the genus *pyrus* grow spontaneously in Europe; the *P. malus* is found as far north as 60° in western Russia. In the United States, the *P. coronaria* or American crab apple is abundant in the middle states and southward; it is about 20 feet high, and the blossoms, which appear in May and are large, rose-colored, and sweet-scented, are followed by a greenish-yellow fragrant fruit about an inch in diameter. The apple does not grow well in warm climates, and although cultivated in China and India, it is only in the cooler and mountainous parts that it lives long, and the fruit is less abundant and inferior in quality. In the Hawaiian islands the apple trees planted some years ago seem to have entirely changed their habit of growth, and send up long, vertical, almost branchless shoots. Wherever the apple occurs in its truly wild state, it is usually armed with thorns while young.—New and choice varieties of apples are obtained by planting seed, as about one in 10,000 of the resulting trees will prove better than the original, and a desirable kind once obtained may be continued by grafting or budding. In culture deep limestone lands are the best, as indicated by the analysis of apple wood and bark by Prof. Emmons, who found in 100 parts of the ashes of sap wood 16 parts potash, 18 lime, 17 phosphate of lime; in 100 parts of the ashes of bark, 4 parts potash, 51 lime. The young trees should be planted in holes of considerable size and depth, setting the tree at the same depth it was in the nursery, taking care to replace none of the barren subsoil, and covering the surface of the ground with a mulching to retain water or liquid manure, which may then be applied without danger of caking the earth about the rootlets. The distance between trees should be from 25 to 40 feet, according to variety, some spreading much more than others. Usually in New England the trees are planted too closely; and the system of lining the stone walls with these trees has much to commend it, as the walls retain moisture and also allow the leaves and snow to drift and accumulate at their sides, thus supplying needed nourishment to the trees; and, moreover, as the rocks wear away they replace the potash in the soil, or, if it be a limestone rock, the limestone which the tree so much needs. Apple trees will not grow well in wet soil, nor where the sod surrounds them; the ground should be stirred up about the trees and well manured with plaster or animal manures, as indicated by the soil, for several years after planting. Alkaline washes on the trunk will preserve the even green bark until the tree is 10 or 15 years old. The rich soils of the western states yield apples of unequalled size, but the flavor is inferior to those produced on eastern limestone soils, or where the proportion of vegetable matter in the soil is less and that of the red oxide of iron greater. Dwarf apple trees are sometimes cultivated for hedges or ornament, and the Chinese raise the tree in pots. Many varieties grafted on the wild crab do well and are dwarfed; but in Europe the favorite stock for dwarfing is the French paradise apple, a naturally small tree, or the English *doucain*. In England and France the trees are trained on walls, as espaliers and balloon-shaped, to insure ripening; but in the United States no such precaution is necessary. Of ornamental blossoming apple trees, the common crab and the double-flowered Siberian crab, both red and white, are much cultivated.—The wood of the apple tree in its wild state is fine-grained, hard, and of a light brown color; and, in exception to the general rule, the cultivated wood is of a still finer and closer grain, weighing in the proportion of about 66 to 45 of the wild wood. In a green state the wood weighs from 48 to 66 lbs. per cubic foot, and it loses in drying about a tenth of its weight and from an eighth to a twelfth of its bulk. It is much used by turners and for the manufacture of shoe lasts, cogs for wheels, and some kinds of furniture; stained black and polished, it passes for ebony; and the wood of the roots is cut into thin sheets or veneers for interior decorations.—The apple as an article of food is probably unsurpassed except by the banana for its agreeable and nutritive properties. Unlike most tropical fruits, it requires no training to become acceptable to the palate, and, whether baked, boiled, made into jellies, or preserved with cider in the Shaker apple sauce or apple butter, is popular everywhere. The exportation of New England ice was accompanied by the exportation of New England apples, which are better suited for this purpose than western ones; and at the ice ports of China and India American apples are to be purchased in as fine a condition as in our own markets. American apples always command a good price in England. Every farmer cuts and dries a supply of apples for use in the late spring and early summer, and immense quantities of apples are pared and cut by machinery, and slowly dried in ovens or in the sun, furnishing an important article of trade. The flavor is much injured by long exposure to the sun. When properly prepared, dried apples will remain good for five or six years if kept in a dry place; and for use it is only necessary to soak them in water a short time previous to boiling. Crab apples make the best jelly, and are also much used for a sweet pickle. The *raisiné composé* of the French is made by boiling apples in must or new wine. By mixing the juice with water and sugar a light fruit wine is obtained. Cider in the United States has never acquired much celebrity from the care of its manufacture, as it has usually been made from the refuse of the orchard. That made from wild apples or seedlings is much the best. In England, in the counties of Herefordshire, Worcestershire, and Devonshire, much cider is made of superior quality. (See CIDER.) To these uses of the apple it may be added that a mixture of apple pulp and lard was the original *pomatum*.—The orchard products of the United States (mostly apples) are stated in the census returns for 1870 to be worth $47,335,189. More than a million acres are under cultivation as orchards, but many more acres of hilly land might be used profitably for this purpose, where no other fruit would grow well. In New England the crop is apt to be irregular, and some years the abundance is so great that the fruit will not pay for picking and sending to market, and is used for cider or to feed swine. The apple tree is not subject to disease, and years ago the fruit was perfectly fair and uninjured by worm or caterpillar in New England, as still in Oregon and the West; but now the borer (*saperda bivittata*) attacks the stem, perforating it a little above the ground; the woolly aphis attacks the tender shoots; the caterpillar (*clisiocampa Americana*) builds its cobweb nests and devours the leaves; the canker-worm (*anisopteryx vernata*) also devours all foliage; the apple moth (*carpocapsa pometaria*) lays its egg at the edge of the calyx, and the larva when hatched enters the fruit; and the bark louse (*coccus*) attacks the bark. The borer may be destroyed, as well as the bark louse and aphis, by potash washes (1½ lbs. of potash to 2 gallons of water), if applied when the egg is unhatched; but after the borer has entered the stem it may be killed by thrusting a wire into the hole. The apple moth is destroyed by feeding all the fallen apples to swine, thus preventing the larvæ from entering the earth, where they undergo their transformations. The caterpillar comes from eggs laid in the fall on the smaller twigs, encircling them, and, as the whole community collects in the nest, may be burned by torches on poles thrust among the branches. The cankerworm is not so easily managed, from the vast number of its armies. As the females are wingless, they may be prevented from ascending the stem to lay their eggs, when they issue from the chrysalis in the ground at the base of the tree, by tar or any viscid substance that will entrap them, and by digging around the trees in the fall and exposing the pupæ to the weather.—The varieties of apple suitable for growth in different parts of the United States have been made the subject of many experiments by the best pomologists; and the national pomological society, founded in 1850 by the late A. J. Downing and others, has published the results. To these reports and to the publications of local societies cultivators are referred for the best kinds for orchards in their vicinity. For general cultivation, the Williams's favorite, a large red apple, the Porter, Newtown pippin, early bough, red Astrakhan, and Gravenstein are recommended for fall use; while for winter the Baldwin, Rhode Island greening, Danvers winter-sweet, fameuse, Hubbardston nonesuch, northern spy, Spitzenberg, minister, Vandevere, and Roxbury russet offer a variety both for cooking and dessert. Some of these, however, do not flourish in New England; others do not bear well in the western states. For exportation the Baldwin, Rhode Island greening, Newtown pippin, Spitzenberg, and Swaar are most in demand. In the Boston market native apples command a higher price than western ones, although the latter are usually larger and fairer. Apples are commonly brought to market in barrels which weigh about 150 lbs.; and Pliny says that this was one of the two fruits known in his time that could be preserved in casks. On the western coast, however, apples are always marketed in boxes somewhat smaller than standard orange boxes, holding about a bushel.

APPLES OF SODOM, a fruit supposed to grow near the Dead sea, fair to the sight, but when plucked dissolving into smoke and ashes. A general opinion, supported by Hasselquist, is that the "apples of Sodom" are to be found in the fruit of the *solanum melongena* (nightshade), which he describes as filled with dust or ashes; or at least, when punctured by a certain insect, as it frequently is, the whole interior of the fruit is converted into a fine dust, leaving the rind entire in form and color. Robinson, in his "Biblical Researches," identifies the apple of Sodom with the *asclepias gigantea vel procera*. The Arabs call it *osher*. It is found on the shores of the Dead sea, and Robinson says that seeing the two (the osher and the nightshade) growing side by side, the former struck him at once from its agreement with the ancient story, while the latter did not. He describes the osher as from 10 to 15 feet high, having a grayish cork-like bark, oval leaves, flowers similar to the silkweed of the northern United States, and as discharging like that plant a milky fluid when broken. The fruit resembles an orange in size and color, but, when even very carefully touched, explodes like a bladder or puff-ball, leaving in the hands only a rind and a few filaments by which the interior was traversed.

APPLETON, a city of Wisconsin, capital of Outagamie county, situated on an eminence overlooking Fox river, 30 m. from its mouth, and 5 m. N. of Lake Winnebago, and on the Wisconsin division of the Chicago and Northwestern railroad, 214 m. from Chicago; pop. in 1870, 4,518. The rapids known as the Grand Chute have here a descent of about 30 feet in a distance of 1½ m. The city is the seat of Lawrence university, a Methodist institution, established in 1847, which in 1871 had 9 instructors, 185 male and 87 female students, and a library of 6,000 volumes.

APPLETON, Daniel, the founder of the publishing house of D. Appleton and company, in New York, born in Haverhill, Mass., Dec. 10, 1785, died March 27, 1849. He commenced business as a retail trader in his native place. He afterward removed to a larger business field in Boston, and subsequently to New York. In the latter place he commenced the importation of English books, and in the course of years, by his energy of character, established one of the largest importing and publishing houses in the United States, which is now continued by his sons.

APPLETON, Jesse, D. D., president of Bowdoin college, born in New Ipswich, N. H., Nov. 17, 1772, died in Brunswick, Me., Nov. 12, 1819. He graduated at Dartmouth college in 1792, was licensed to preach in 1795, and in February, 1797, was ordained the pastor of a church in Hampton, N. H., where he remained 10 years. From 1807 till his death he was president of Bowdoin college. In addition to the duties appertaining to his office of president, he was often called upon to preach in the neighboring towns, besides which he preached before the Bible, missionary, and peace societies of Maine, the American board of foreign missions, the Massachusetts legislature, and numerous other public bodies. He was the father-in-law of the late president Franklin Pierce. Two volumes of his sermons, lectures, and addresses have been published.

APPLETON, Nathan, an American merchant and political economist, born in New Ipswich, N. H., Oct. 6, 1779, died in Boston, July 14, 1861. In 1813 he was associated with Francis C. Lowell and Patrick T. Jackson in establishing at Waltham near Boston a cotton mill, in which was set up the first power loom ever used in the United States. In 1821 he became one of the founders of the Merrimack manufacturing company, from which originated the city of Lowell; and he was the projector and chief proprietor of the Hamilton company. He was distinguished as a steady advocate of the protective system. In 1815 he entered the legislature, and was several times reelected. In 1830 he was chosen a representative in congress from Boston, and during the first session opposed McDuffie's report on the tariff, in a speech characterized by Mr. Webster as "a model of close reasoning on an abstruse subject." In 1842 he was again elected to congress, and aided in securing the passage of the protective tariff bill of that year; but after the close of a single session he resigned his seat. His little treatise entitled "Remarks on Currency and Banking" (enlarged edition, 1857), has been pronounced "almost worthy of being studied in the schools as an elementary manual." He also published an account of the introduction of the power loom and the origin of the city of Lowell. He accumulated a large estate, and was noted for his integrity and philanthropy.

APPLETON, Samuel, an American merchant and philanthropist, brother and partner of the preceding, born in New Ipswich, N. H., June 22, 1766, died in Boston, July 12, 1853. His opportunities for study were confined to the district schools, and at the age of 17 he became himself a teacher. In 1794 he established himself in trade in Boston. He was for many years a heavy importer of English goods, and at a later period largely engaged in the cotton manufacture. At his death his fortune amounted to nearly $1,000,000, and he had given away nearly as much as that during his lifetime. He endowed the academy at New Ipswich with a fund which secured its permanence, and founded the professorship of natural philosophy of Dartmouth college, with a gift of $10,000. In his old age he became more and more absorbed with a desire to relieve the sufferings of the poor, and intrusted physicians and others with large sums for that purpose. By his will he placed property to the amount of $200,000 in the hands of his executors, "to be by them applied, disposed of, and distributed, for scientific, literary, religious, and charitable purposes."

APPLING, a S. E. county of Georgia, bounded N. and E. by the Altamaha river, and drained by the affluents of the Santilla; area, 1,060 sq. m.; pop. in 1870, 5,086, of whom 976 were colored. It has railroad communication with Brunswick and Macon. The surface is level and sandy. In 1870 the county produced 63,063 bushels of corn, 39,508 of oats, 38,106 of sweet potatoes, 48,500 lbs. of rice, 12,509 gallons of molasses, and 152 bales of cotton. Capital, Holmesville.

APPOLD, J. George, an English inventor, born in 1799, died at Clifton, Aug. 31, 1864. The paying-out apparatus used in laying submarine telegraphs was chiefly his invention. His centrifugal pumps for drainage purposes attracted much attention at the international exhibitions of 1851 and 1862. In his own house and its surroundings almost everything was automatic, doors and shutters opening and closing mechanically. He had also secured a monopoly as a dresser of furs by a secret process.

APPOMATTOX, a county of Virginia S. E. of the centre of the state, bounded N. W. by the James river, and drained by the sources of the Appomattox; area, 260 sq. m.; pop. in 1870, 8,950, of whom 4,536 were colored. The surface is diversified and covered with forests, and the soil is fertile. The county is intersected by the Atlantic, Mississippi, and Ohio railroad, running from Norfolk to Bristol. In 1870 the county produced 38,825 bushels of wheat, 76,708 of corn, 65,858 of oats, and 656,944 lbs. of tobacco. Capital, Appomattox Court House, or Clover Hill.

APPOMATTOX COURT HOUSE, a village, capital of Appomattox county, Va. (locally called Clover Hill), 20 m. E. of Lynchburg. On April 9, 1865, Gen. Lee here surrendered the army of northern Virginia to Gen. Grant. Of this army only 27,805 remained. The rest had been killed and taken prisoners, or had deserted, during the battles around Richmond, and after its evacuation on the 2d. There were delivered 350 wagons, about 10,000 muskets, and 30 pieces of artillery.

APPOMATTOX RIVER rises in Appomattox and Prince Edward's counties, Va., and flows circuitously E. about 120 m. to the James river at City Point. It has a narrow and deep channel, and is navigable for vessels of 100 tons to Petersburg, about 12 m. from its mouth. By a canal round the falls at Petersburg, vessels of four or five tons ascend to Farmville, about 80 m. further.

APPONYI, one of the oldest noble families of Hungary, several members of which have achieved considerable prominence in the Hungarian or Austrian service, among them the following: **I. György Antal,** count, born in 1751, officiated as member of the royal lieutenancy in Buda, and subsequently as lord-lieutenant of the county of Tolna, but chiefly distinguished himself as founder of the Apponyi library, a large and valuable collection, opened to the public in Presburg in 1827, ten years after his death. **II. Antal,** son of the preceding, born in 1782, was equally remarkable as a patron of literature and art and as a diplomatist, serving successively, as a representative of Austria, at the courts of St. James, Rome, and Paris. He died in 1852. **III. Rudolf,** his son, born in 1812, chose the career of his father, was appointed Austrian minister at Turin in 1849, transferred to London in 1856, made ambassador there in 1860, and relieved in 1871 by Count Beust, when he was sent by Count Andrássy as ambassador to Constantinople. He died in 1876. **IV. György,** cousin of the preceding and grandson of György Antal, born in 1808, was a conspicuous member of the conservative party at the diet of Presburg in 1843–'4, and became Hungarian court chancellor in 1847. He lived in retirement during and after the revolution of 1848–'9, and accepted in 1859 a position in the wider Reichsrath of Vienna, where he furthered with great energy and ability various schemes for the restoration of the constitution of his country. In 1860 he was made *judex curiæ*, in 1861 opened as royal commissioner the diet of Pesth, and by his mediatory position was in the following years, next to Francis Deák, the most influential person in bringing about the reconciliation between Hungary and the court of Vienna, which in 1867 culminated in the transformation of the Austrian empire on the basis of nationality and constitutionalism. A leading conservative, Count Apponyi is esteemed by all parties as a patriot and a statesman.

APPRAISEMENT (Lat. *appretiare*, to set a price upon), a valuation of property by persons authorized to make it by the law or by stipulation between the parties. The three principal kinds of appraisement known to American law are: of the inventoried property of decedents and insolvents; of property taken for public use; and of real estate seized upon execution. In some states the creditor may enforce a sale of his debtor's lands without a previous appraisement; in others an appraisement is a necessary prerequisite. In some states land once sold on execution is irredeemable by the debtor; in others he has a right to redeem it within a reasonable period, six months or a year, at the appraised value, with interest. There are states where the creditor has no right to sell upon execution, but may take the property of his debtor in payment so far as it goes, at two thirds of the appraised value; in case of refusal the levy is discharged, and the creditor must pay costs.

APPRENTICE (Fr. *apprendre*, to learn), a person bound to service for a term of years, and receiving in return for such service instruction in his master's business. Apprenticeship had its origin in the system of associated trades which prevailed in almost all parts of Europe in the middle ages. Those only who were free of the fraternity of a trade were allowed to exercise it; and the usual, if not the indispensable, mode of acquiring this freedom was through an apprenticeship to a member of the body, for a time and under regulations varying in different towns and in different trades in the same town. In some instances the rules designed to limit the numbers of the fraternity were so strict as to prohibit the master from taking any apprentice but his own son. In France, the apprentice, after having served in that capacity from three to eight or ten years, served as a journeyman, called the *compagnon* of his master, a number of years more, after which he was entitled to admission as a master into the *communauté* or *corps de marchands*, if the *chef-d'œuvre* which he was required to deliver to the *jurande*, wardens of the company, showed him to be a proficient in his art. Sons of merchants living with their fathers until they were 17 years old were entitled to the privileges of those who had served their apprenticeship. These companies were abolished at the revolution, but the contract of apprenticeship, although no longer imperative, is still frequently entered into in France, and there are statutes regulating the rights and duties of the parties to it. In Germany, where the system exists to the present day, in a more or less modified and legally limited form, the term of apprenticeship, *Lehrjahre*, is generally about seven years, but sometimes less. The apprentice, after serving for the prescribed term, becomes a *Gesell*, like the French *compagnon*, and is entitled to receive from the guild a general letter of recommendation, armed with which he commences his travels. Being recognized and employed by his brethren of the same craft, he works his way from town to town, and on returning with certificates of good conduct during his *Wanderjahre* is entitled to become a master. In Italy the contract of apprenticeship resembled that in use in England. In Scotland and Ireland the regulations regarding it were never rigorous, and those existing in the latter country were early superseded by English laws designed to encourage immigration.—In the 12th century guilds were formed in England, and shortly afterward, without doubt, apprenticeships came into vogue, although there is no notice of them in the statutes until the year 1388. The London apprentices, many of whom were of high birth or had wealthy masters, formed an important body and figure in history, particularly during the time of the civil wars. The term of apprenticeship was fixed at seven years, which had been the ordinary period of service previously, by a statute passed in the reign of Elizabeth. The institution became so widespread that acts designed to limit the number of apprentices were passed, and the courts showed no favor to the laws which recognized and supported the relation, but restricted their operation to trades existing at the time of their passage; a doctrine which, while giving rise to some absurd anomalies, exempted most of the large manufacturing towns from the operation of the act of Elizabeth. In 1813 numerous petitions for the repeal of this statute were presented, and shortly afterward apprenticeship, as a necessary means of access to a trade, was abolished. The English law on the subject has been revised and settled in the master and servant act of 1867 (30 and 31 Victoria, ch. 141); and in almost all our states the contract of apprenticeship is provided for by express statutes, most of them, at least in the older states, being of an early date. The statutory law of New York had been till 1871 very little changed since the original act of 1801.—The contract of apprenticeship is made between the master on one side and the infant and usually his parent or guardian on the other. It is commonly in writing and under seal, and is to be regarded like any other contract of that sort. It has been said that at common law the infant is bound by an engagement of this sort, because it is an agreement that certainly must be for his benefit. But it is probable that this is not the rule, and that the infant is not bound by his contract of apprenticeship more than he is by any other of his contracts. The statutory law may however declare that he shall be bound in such a case, and it usually does. It has also been held in the United States, though otherwise in England, that at common law the parent or guardian may bind the minor without his joining in or assenting to the articles. But the statutes of almost all our states expressly require the infant's assent. The long existing statute of New York on the subject may be referred to as fairly illustrating the American law on the subject. By that statute, every male infant and every unmarried female under the age of 18 years may with the consent of the proper parties bind himself or herself in writing to serve as clerk, apprentice, or servant in any trade, profession, or employment, if a male till 21 years of age, and if a female till 18 years of age, or for any shorter term; and such engagement is as binding on the infant as if he or she were of full age. The engagement, however, must be with the consent of the father; and by a statute of 1862, if the mother be living, it is not valid without her written consent also. But if the father be dead, or incapable of giving his assent, or have neglected his family, the consent must be given by the mother; or if she be dead, or incapable, or refuse, then by the legally appointed guardian; or if there be none, or he be incapable, then by the overseers of the poor or any two justices of the peace of the town where the infant resides. The consent in either instance must be in writing. The executor of a father's last will, who has been directed to bring up the child to some trade or calling, may also bind the infant to an apprenticeship. Superintendents and overseers of the poor of counties, or overseers of the poor of a town, with the consent of two justices of the peace, or of the mayor, recorder, or an alderman, may also bind out children who are charges on a county, town, or city. By recent statutes idle and truant children may also be bound to apprenticeships by similar officers. The age of the infant must be stated in the indentures, and will be taken to be the true age; but public officers authorized to make the contract must inform themselves of the true age fully. Any sum of money agreed to be paid by the master must be mentioned in the articles. If the child is apprenticed by public officers, the indentures must contain an agreement on the part of the master that he will cause the child to be taught reading and writing, and if a male, arithmetic. Any person coming from a foreign country may bind himself to service—if an infant, until 21 years of age; and if the agreement is made in order to earn the price of his passage money to this country, it shall not be for a longer term than one year, and in this case the indenture must be acknowledged by the apprentice on a private examination before the mayor, recorder, alderman, or justice of the peace. An indenture of this sort may be assigned by the master with the consent of either of these officers. No indenture is valid against the apprentice unless it is made in the manner here prescribed. If the apprentice absent himself from his service, he must serve double time, though not for more than three years beyond the original term. Complaints by the master of the misbehavior of the apprentice are to be heard by certain officers, and the apprentice may be punished by confinement, or in a proper case the officers may discharge the apprentice from his service, and his master from all obligation to him. The apprentice may also be discharged from service by the same officers on his complaint of ill usage by his master; and in such a case the master may be bound over to answer in a court of sessions. The law in these respects is substantially the same in Michigan, Wisconsin, Iowa, and Kentucky as in New York. By a recent statute of New York (1869) all institutions for the reception of minors must, on binding children in their charge to apprenticeships, take bonds to the people, in which the master shall undertake to treat the children kindly. By the statute of New York passed in 1871, it is provided that it shall not be lawful to take as an apprentice any minor without first obtaining the consent of his legal guardians; nor shall any minor be taken as an apprentice unless an indenture be drawn up according to the requirements of the act; and the indenture must be under seal, and signed by the employer, the apprentice, and his parents or parent if living, or if not, then by his legal guardians. The indenture, to be valid, must also contain certain covenants and provisions expressly prescribed by the act. The apprentice shall engage to serve not less than three nor more than five years, and shall also covenant not to leave his master during the term of service. The master must covenant to provide the apprentice proper board, lodging, and medical attendance; to teach him every branch of the business for which he is indentured; and at the end of the term to give him a certificate in writing stating that he has served his full time. Any person taking an apprentice without complying with these requirements is guilty of a misdemeanor and liable to a fine of $500. No indenture made under the statute shall be cancelled before the expiration of the term except in case of death, or by an order of a court for good cause. If the apprentice leave his employer without his consent or without good cause, and refuse to return, he may be arrested and committed to a jail or house of correction for such term as the magistrate may think just. If the apprentice refuse or neglect to perform his part of the contract, the indenture may be cancelled for the benefit of the master; and the apprentice forfeits all wages then due him. If the master refuses to perform his part of the contract, the parent or guardian may bring an action for damages against him, and may recover not less than $100 nor more than $1,000, to be paid to the apprentice or to his parent or guardian for his benefit. In Vermont minors above 14 years of age may be bound as apprentices by their father or guardian, and the consent of the minor must be attested by his signature to the indentures. The law on this point is similar in Rhode Island, Connecticut, New Jersey, Pennsylvania, Missouri, and other states. In Ohio, if the guardian binds the infant, the court of common pleas must approve the contract.—Among the more important and practical points which have been decided in respect to apprenticeship, it has been held that as the agreement on the part of the master is in the nature of a personal trust, the indenture cannot be assigned by him, at all events not without the infant's consent, or unless, as by the custom of London, such assignment be sanctioned by settled usage. But an assignment without the infant's consent, though it do not bind him, may hold the master to his own covenants. In some of our states the consent of both father and infant is made essential. The apprentice cannot abandon the service unless his master desert him. Nor is the apprentice's misconduct in general a defence for the master in an action against the latter on his covenants. For though one may dismiss a mere servant for misconduct, a master cannot turn away an apprentice for ordinary misbehavior, such as idleness or drunkenness; but he may discharge him for theft or for any wilful injury. Illness of the apprentice does not discharge the master; and in a recent case in Massachusetts the father recovered full wages for the whole period of the apprentice's last illness and up to the time of his death. The master is also bound to provide proper medicines and care for the apprentice in case of his sickness. If the apprentice run away and go into another person's service, the master is entitled to recover the full value of his labor, without deduction of the wages paid the apprentice by his new employer. The master has also an action for the value of the apprentice's services against any one who entices him away, or wilfully harbors him after his desertion, with a knowledge of the apprenticeship. Though the master may chastise the minor as a parent may, yet he cannot authorize any one else to inflict the punishment; and it has been held in New York that whipping the apprentice for absenting himself at a trial where he was required as a witness, was assault and battery. Where an apprentice was bound to the master and his executors, they carrying on the same business, it was held that the widow, who was executrix and continued the master's business, was bound to instruct the minor, and he was bound to render her service. As the infant is not bound at common law by his covenants, it is usual to take security from some responsible person for the performance of the contract by the apprentice; and in such a case the surety must be a party to the articles. The contract is dissolved by consent of all parties. The death of the master also discharges the obligation of the apprentice, and so does his bankruptcy or insolvency, or his abandonment of the business in which he agreed to instruct the apprentice.

APRAXIN. **I. Feder**, a Russian grand admiral, born in 1671, died Nov. 10, 1728. He was one of the leading men of the reign of Peter the Great, and is especially remarkable as the creator of the Russian navy. During the war between Sweden and Russia he expelled the Swedes from Ingria, in 1710 conquered Viborg in Finland, and when war with Turkey broke out, in 1711, he commanded in the Black sea. In 1713 he attacked Finland from the sea, and devastated the shores of Sweden, destroying hundreds of villages, and many towns and iron works. He accompanied Peter in his warlike expedition against Persia, and served on the Caspian sea. He always enjoyed the entire confidence of Peter, though firmly opposed to his reforms, and more than once implicated in extensive malversations. **II. Stefan Federovitch**, a relative of the preceding, died Aug. 31, 1758. When young he served in the army of Münnich against the Turks, rose rapidly, and, returning to the court of the empress Elizabeth, distinguished himself by his decided opposition to the policy of the king of Prussia and his diplomatic adherents, including Count Lestocq, the favorite of the empress. At the beginning of the seven years' war Apraxin, with the rank of field marshal, commanded an army against Frederick the Great. In May, 1757, he invaded Prussia, took Memel, advanced into the interior, destroying everything, and on Aug. 30 won the battle of Gross-Jägerndorf against the Prussian general Lehwald. Instead, however, of marching on Berlin, to which capital the road was open, Apraxin retreated to Courland, having, as it is pretended, received news of the sickness of the empress Elizabeth, and having conspired with the grand chancellor Bestusheff to raise to the throne her grandnephew Paul, over the head of his father, Peter III. After the empress recovered, Apraxin was tried by court martial, but died in prison before the trial ended.

APRICOT (old Eng. *apricock*, Fr. *abricot*, Ger. *Aprikose;* probably from Lat. *arbor præcox*, early tree), the fruit of *prunus Armeniaca* or *Armeniaca vulgaris*, of the order *rosaceæ*. It is a small, rapidly growing tree, attaining to the height of 20 to 30 feet, with a somewhat spreading head, the leaves heart-shaped, smooth, and shining. The flowers are usually white and appear before the leaves—indeed, blossoming before any other fruit tree in the early spring. The fruit seems to be intermediate between the peach and plum, having the outside of the former and the stone of the latter. The tree is a native of Armenia, and also of the Caucasus, Cabool, the Himalayas, China, and Japan, and by cultivation has been introduced throughout the temperate zone. The tree was cultivated by the Romans, and is mentioned by both Pliny and Dioscorides. The Roman generals introduced it into Gaul and Britain, although the first notice that has been found of its being in England is by Turner, whose "Herbal" was printed in 1562. There it seldom ripens its fruit unless trained against a wall. In California vast quantities are raised, of a large size and fair quality, ripening before the peach. In its wild state the fruit is small, of a waxen yellow color, rosy-cheeked, and of a pleasant, slightly acid flavor. It is dried in large quantities in the East under the name *mishmish*, and the preserved apricots of Damascus are favorably known to all travellers, and sometimes imported into the United States. The best varieties are the Moor Park and the Brussels and Breda, the last two being especially adapted to the confectioner's purposes. The Siberian apricot is cultivated for its foliage and flowers. The chief enemies of this fruit in the United States are a species of curculio, which causes the early dropping of the immature fruit; the black wart, which attacks the branches; and another fungus which destroys the leaf. Apricots are seldom seen in the New England markets, and they are by no means common in New York.

Apricot—Fruit, Flower, and Pit.

APRIES (Eg. *Uahprahet*, the sun enlarges his heart), a king of Egypt of the 26th dynasty, the Hophra of the Bible, and the Uaphris of Manetho, succeeded his father Psammis (Psamatik II.) about 588 B. C. He invaded Syria, besieged Sidon, and fought a naval battle with the king of Tyre, but failed in his attempt to save Zedekiah from Nebuchadnezzar, who subsequently invaded Egypt. Apries was still more unfortunate in a war against Cyrene, and perished soon after, according to Herodotus, by a revolt of his subjects, who raised Amasis to the throne (about 569 B. C.).

APRIL (Lat. *Aprilis*), the 4th month of the year, consisting of 30 days. With the Romans it was the 2d month of the year. Julius Cæsar added the 30th day to it. In the time of Nero it was called Neroneus. The name is supposed to be derived from *aperire*, to open, because the buds open themselves at this period. In the Athenian calendar, the latter portion of Elaphebolion and the greater part of Munychion correspond to April. Charlemagne, in his new calendar, called it grass month, the name still given to it by the Dutch (*grasmaand*). The French revolutionary calendar merged it into the greater portion of Germinal and the commencement of Floréal. On antique monuments Aprilis is represented as a dancing youth with a rattle in his hand.—The custom of sending people on empty errands on the 1st of April (hence called All Fools' Day) is common in every country of Europe. Oriental scholars say that it is derived from the *huli* feast among the Hindoos, where a similar custom prevails. Another opinion is that it comes from a celebration of Christ's being sent about to and fro between Herod, Pilate, and Caiaphas. In France the fooled man is called *poisson d'avril*, meaning a silly fish, easily caught. In Scotland he is called gowk, which means a cuckoo.

APTERAL (Gr. ἀ privative and πτερόν, wing), an architectural term used particularly with reference to the temples of the ancient Greeks and Romans. It is applied to buildings which have no lateral columns, but may have porticos of columns projecting from their ends.

APTERYX, a struthious bird of New Zealand, called by the natives *kiwi-kiwi* from its peculiar cry. It belongs to the family which contains the living cassowary, emu, mooruk, and ostrich, and the extinct æpyornis, dinornis, and dodo. The beak resembles that of a long-billed wader, being slender, with the base covered with a bony cere, the upper mandible the longer and containing the openings of the nostrils near the tip; the base of the bill is furnished with long, slender black bristles, intermixed with the feathers, and projecting in all directions; the wings are 2 small crooked appendages, extending about 1½ inches from the sides of the chest, and terminated by a curved, obtuse, horny claw 3 lines long, having 9 quill plumes differing but little from those of the body; the tail is not apparent; the tarsi are as long as the middle toe, covered with variously sized scales, and very robust as in gallinaceous birds; there are 3 anterior toes, free and covered with scales, and a very short hind toe, all armed with strong and rather sharp claws. The plumage is loose as in other terrestrial birds which have no power of flight, resembling that of the emu in size, structure, and color, but wanting the accessory plumelet; the skin is very tough, a line thick along the back, and there is a large amount of fat between it and the muscles, especially on the back, abdomen, and root of neck; the head is broad and but slightly depressed. The genus *apteryx* was established by Shaw in 1812 from a stuffed skin, and was at that time supposed to have become extinct like the dodo; but in 1833–'8 other specimens arrived, which are described by Mr. Yarrell in vol. i. of the "Transactions of the Zoölogical Society of London," and by Prof. Owen in vols. ii. and iii. of the same work.

Apteryx australis.

Three species are described. *A. australis* (Shaw) is about 30 inches long from tip of bill to end of toes, 19 inches to end of coccyx, and weighs about 8¼ lbs.; the bill varies in length from 4¼ to 6¾ inches, the longest belonging to the females, another anomaly in this bird; the bill is 1 inch wide at the gape and 7 lines high; the color is grayish brown, darkest on the back. *A. Mantelli* (Bartlett), described in 1850, is about 23 inches long, with a bill of 4 inches; the color is dark rufous brown, darkest on the back. *A. Oweni* (Gould), described in 1847, is the largest species, and is said to be about 3 feet high; the upper parts are transversely barred with blackish brown and fulvous, and the plumage is exceedingly dense and hair-like, resembling more the covering of a mammal than a bird; the bill is an inch shorter, more slender, and curved; the wings are exceedingly rudimentary. The large size of the unhatched young, and the possession within the egg of the remarkable characters of feet, wings, and beak of the adult, show that the young apteryx must be able to provide for itself very soon if not immediately after leaving the egg. The bill of the apteryx is moderately strong, as the bird is said to be in the habit of resting the head upon it against the ground, and to thrust it into the soil in search of food; it is struthious in structure, and grallatorial only in its length and slenderness. There is no trace of extension of air cells, as in birds of flight, into the interspaces of the abdominal viscera, and the diaphragm is well developed and pierced only for the œsophagus and vessels; the lungs are bird-like, and also the organs of circulation, except in the more membranous character of the right auriculo-ventricular valve; the larynx and trachea are struthious. The bones are not perforated for the admission of air.—These birds are found in New Zealand, particularly in regions covered with extensive and thick beds of ferns, in which they hide when alarmed. They are nocturnal in their habits, feeding upon snails, insects, worms, and the large soft-bodied lepidopterous larvæ; they run swiftly and defend themselves vigorously with the feet. The nest is made either at the base of a hollow tree or in deep holes which they excavate in the ground. The natives pursue them for their skins, which from their strength are highly valued for making dresses.—Though a living specimen has been seen at the zoölogical gardens in London, the apteryx is probably nearly extinct; the æpyornis is supposed to be extinct, though some believe that it may yet exist in Madagascar; the dodo has been lost within the memory of man; and the dinornis doubtless antedated the historic period.

APULEIUS, or **Appuleius**, a Roman satirist, born at Medaura in Africa about A. D. 130. By his mother he was a descendant of Plutarch. After studying at Carthage, he began to travel for the purpose of learning philosophy and religion. Coming to Rome, he was obliged to sell his clothes in order to obtain the sum necessary for his initiation into the service of Osiris. He soon repaired his fortune by marriage with a rich widow in Africa, whose relations instituted legal proceedings against him, alleging that he had used magic to win her property and affections. But in his defence Apuleius satisfied the judges that a widow of 14 years' standing needed not the constraint of magic in taking a husband younger than herself. The most celebrated of the numerous works of Apuleius is the "Metamorphoses, or the Golden Ass," a philosophical romance, written, according to Warburton, to ridicule Christianity. But the more probable design of the author was to show, under the guise of allegory, that a voluptuous life leads to bestiality, from which a man can be lifted only by cultivating virtue and religion. The justly famous tale of Cupid and Psyche forms an episode in this work. His writings on ethics and metaphysics are a good epitome of the works of Plato; but the development of that philosopher's more profound doctrines was reserved for subsequent inquirers. The best edition of Apuleius is by Hildebrand (Leipsic, 1842). An English version appeared in London in 1853. "The Golden Ass" has also been translated by T. Taylor (London, 1822) and Sir G. Head (London, 1851).

APULIA, a division of ancient Italy, comprising nearly all that territory now included in the provinces of Capitanata and Terra di Bari, near the S. E. extremity of the peninsula, bounded by the Adriatic, Messapia or Calabria (Terra d'Otranto), the gulf of Tarentum, Lucania, and Samnium. At a remote period the Greeks called the whole southeastern part of Italy, including both these divisions and other territory, by the name of Japygia, after Japyx, the son of Dædalus. This district was inhabited by three tribes, the Messapians or Salentini in Messapia, the Peucetii in the region near the Aufidus (Ofanto), and the Daunians further north. The Romans, however, ignoring these divisions, called all the region, except Messapia, Apulia. The Apulians first appear in history as concluding in 326 B. C. a treaty of alliance with Rome against the Samnites, which they soon after repudiated, thus becoming involved in war with the Romans. In 317 all the Apulian cities submitted to Rome. It was the chief theatre of the most important part of the second Punic war, and the battle of Cannæ was fought within its borders in 216. Many Apulian cities made common cause with Hannibal, but were severely punished on their recapture by Romans. A great portion of Apulia again turned against Rome in the social war, but was resubjugated and harshly punished by C. Cosconius in 89. The province appears to have suffered so severely from the conflicts carried on within it, that from this time it declined in wealth and prosperity; and little is said of it until its union, under Augustus, with Calabria (in the ancient meaning of the term) and the territory of the Hirpini, the three forming the "second region" in that emperor's division of Italy. The Hirpini were afterward transferred into the "first region," Calabria and Apulia forming one province, down to the fall of the western empire. The Byzantine emperors regained control of it in the 10th century, after its possession had been long an object of contention between the Lombards, Saracens, and themselves, and held it under a viceroy called a *catapan* until it was conquered by the Normans in the 11th century, who made it a duchy, Robert Guiscard, their leader, becoming its first duke. His son Roger united it, as well as Campania and modern Calabria, with his kingdom of Sicily. The modern name of part of the territory, Capitanata, is a corruption of Catapanata, from *catapan*. The principal cities of ancient Apulia were Teanum, Luceria, Arpi, Salapia, Canusium, Venusia, and Barium. The district is by the Italians called Puglia, but not officially.

APURE, a river of Venezuela, has its sources in Colombia, in the eastern chain of the Andes, flows between the provinces of Varinas and Apure in an E. N. E. direction, receiving the waters of the Portuguesa, Guarico, and other affluents from the north, flows then E. S. E., and unites with the Orinoco, of which it is an important tributary, in lat. 7° 40′ N., lon. 66° 45′ W. According to Humboldt, its mean descent is about 14 inches to the mile; but the current in the lower part of its course is hardly perceptible, and any rise in the waters of the Orinoco causes it to overflow its banks. The lands thus overflowed yield, after the water has retired, a rich and excellent pasturage.

APURIMAC, a river of Peru, which rises in lat. 15° 21′ S., lon. 72° 10′ W., not far from the sources of the river Camana, in a lake situated between spurs of the mountains of Caylloma. It flows N. for a short distance, then N. N. W. for about 165 m., receiving several other streams, to its junction with the Mantaro in lat. 12° S., and from that point is known as the Tambo as well as the Apurimac. Hence it flows first N. E., then N. N. W. for more than four degrees of latitude nearly parallel with the Urubamba, and they unite and form the Ucayale in lat. 8° 30′ S., lon. 73° 24′ W. The Apurimac and the Urubamba collect the moisture of the high plateau of the interior of Peru, and are among the largest tributaries of the Amazon, the former being sometimes reckoned its source.

AQUA (Lat. water), a favorite prefix of the old alchemists to various fluid mixtures, as *aqua fortis*, now called nitric acid; *aqua regia*, the mixture of nitric and muriatic acids, used to dissolve gold, the king of the metals, now called nitro-muriatic acid, or nitro-chlorhydric acid; *aqua vitæ*, now alcohol. *Aquamarine* is an old name given to a fine variety of beryls from the color resembling the green of sea water.—The *aquæ* of the pharmacopœia consist of water holding volatile or gaseous substances in solution. Those which receive a name from some volatile vegetable substance, as *aqua cinnamomi* or *aqua camphoræ*, contain very much less of the active ingredient than the corresponding tinctures.

AQUA TOFANA (Ital. *acqua della Toffanina*), a secret poison employed in Italy during the latter part of the 17th century, and said to have been invented by a woman named Tofana, a native of Sicily, who lived for a time in Palermo, and subsequently in Naples, where she exercised her criminal art on a large scale. Her customers are said to have been chiefly young wives who wished to be rid of their husbands; and when the number of mysterious deaths about the year 1659 at last aroused suspicion, a secret society of young married women was discovered, presided over by a creature called La Spara, who had learned the art of poisoning from Tofana. La Spara and several others were executed. Tofana was thrown into prison, but the date and manner of her death are uncertain. According to Labat, a French traveller, about 1709 she was seized in a convent in which she had taken refuge, and having, on being tortured, confessed 600 poisonings, she was strangled in prison. On the other hand, Keysler, a German traveller, says he saw her in prison at Naples, a little old woman, in 1730. The poison was put up in small phials, labelled "Manna of St. Nicholas of Bari," with an image of the saint on one side. Incredible and contradictory accounts are given of its nature and effects; it is most probable that it was essentially a strong watery solution of arsenic obtained by long boiling. The use of such an article, even in the dose of five or six drops, frequently repeated for a length of time, would cause death with many of the symptoms ascribed to the aqua Tofana.

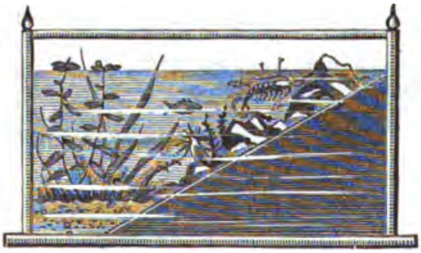
AQUARIANS, or **Hydroparastatæ,** a sect of ascetics in the early Christian church who, from scruples against the use of wine, were in the habit of consecrating water for sacramental purposes. It was founded in the 2d century by Tatian, a disciple of Justin Martyr.

AQUARIUM, or **Aquavivarium,** a term applied to certain artificial arrangements for the exhibition and study of living animals and plants inhabiting either fresh or salt water. To Mrs. Power, a lady of French descent, belongs the credit of first adopting the aquarium as an aid to scientific research. This intelligent and enthusiastic naturalist, during the year 1832, began the study of the fishes and algæ off the coast of Sicily, by transferring them to glass tanks in which the water was often renewed; and this renewal or revivification of the water was long regarded as essential to the health and vigorous growth of the inmates, it being argued that as the air is contaminated by the breathing of animals living upon the surface, and its oxygen is combined with the carbon furnished by the organic body, so the air contained in the water is consumed by administering to animal life, and the gaseous product is not only unfit for longer sustaining this, but, unless removed, proves fatal to it. But subsequent investigations into the various phenomena of vegetable and animal growth have determined that it is the office of plants to restore to the atmosphere the oxygen, and absorb the excess of carbon; and it appears that the subaqueous vegetation fulfils the same office in preserving the purity of the air in the water, upon which depends the life of the animals it contains; and that this balance may not be destroyed by the presence of poisonous gases, the results of decomposition and decay, it was found needful to add certain animals which feed on decomposing vegetable matter, and act as the scavengers in this community. Such are the various species of the molluscous animals, as the snails. It is also of importance to guard against the preponderance of animal life in these artificial tanks or jars; for although there can hardly be too many plants for the health of the animals, as long as they grow healthily and do not decompose, yet an excess of animals over plants will disturb the balance, and lead to the destruction of the former. *Valisneria spiralis*, various species of *chara*, *anacharis alsinastrum*, *stratiotes aloides*, *callitriche autumnalis* or *vernalis*, *ranunculus aquatilis*, and *myriophyllum spicatum* are among the fresh-water plants adapted to this purpose.—The fresh-water aquarium is more easily constructed and requires less skilful management than the marine tank. It should be square or hexagonal, as curved surfaces distort the forms of the inmates, and a greater number of sides increases the liability to leakage. Where metal corner posts are used, they should be plated if possible, as the oxidation of the metal often results disastrously. The glass plates should be held in position by hydraulic cement; that known as Scott's is highly recommended. Where putty only is available, it should be painted, the tank filled with water for a week or more, and then carefully cleaned before receiving the fishes and plants. The bottom should be covered to a depth of an inch or more with well washed river sand, and its surface thickly strewn with pebbles; clay or mould should be avoided, both because of the vegetable germs it may contain, and because its frequent disturbance by the fish renders the water turbid. The use of tastefully arranged rockwork adds greatly to the beauty; but rocks containing metallic substances should be rejected; and where shells are used, they should first be well soaked or calcined in order to destroy all organic matter contained in them. In constructing these arches or columns Portland cement may be used to advantage, and some point of the structure should project above the water level. Thus arranged, the tank, which should be at least 12 inches deep, may be filled with fresh spring or river water to within an inch of the top, and it is then ready for occupation. Such fresh-water plants as the *butomus*, *nymphæa*, and *alisma* should have their fibrous roots extended and gently imbedded in the sand, with a layer of pebbles to keep them in position. All river plants that bud and root from points on the stem, as *anacharis*, *ranunculus*, *callitriche*, and *chara*, can be raised by securing them in tufts to the sandy bottom by a light layer of pebbles. There are certain plants which, in addition to beauty of structure and vigorous growth, are of great service as oxygen producers; such are the *valisneria spiralis*, water thyme (*anacharis alsinastrum*), with the flowering water crowfoot (*ranunculus aquatilis*), milfoil, and starwort.—Though the stocking of the aquarium depends largely upon the purpose it is to serve, yet caution is needed as to the number and habits of the inmates. A young pickerel only an inch and a half long has been known to devour 25 minnows in a week. For general interest, the stickleback takes the lead among the fishes, and for beauty the gold fish, tench, gudgeon, perch, minnow, and Prussian carp all flourish, with snails and mussels as purifiers. Where the proper balance is not easily maintained

Fresh-Water Tank.

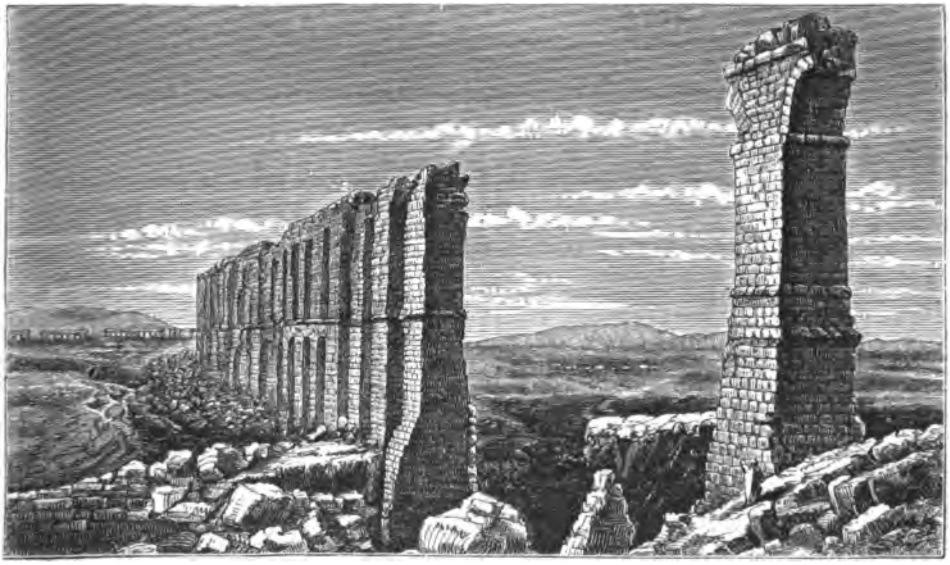
and the renewal of the water is difficult, it may be revivified by dipping out and pouring back in a small stream from a proper height. As in the marine tank, an excess of sunlight is apt to encourage the growth of a minute green fungus, besides unduly elevating the temperature, which should range between 40° and 60° F.—The marine tank, owing to its greater range, and the extreme sensitiveness of its animals and plants, requires more constant and careful management. As a rule it should be more shallow. To secure this, and also obtain sufficient depth of water for fish and hardy plants, a tank having its back and two ends opaque has been successfully adopted, in which case these may be of the same material as the bed plate—marble, slate, or well seasoned wood. The front is of glass, and the bottom an inclined plane rising from the lower corner in front to above the water level behind; on this rest the rock and shell work. The triangular space between the front and this plane may be filled to the depth of an inch or two with sand and gravel, with a sprinkling of the same among the rocks and shells above. The purpose of this sloping floor is to afford the anemones, actiniæ, &c., which move seldom and slowly, to approach the surface and recede from it at pleasure. Marine plants purify sea water, as fresh-water plants purify fresh water. The difficulties of maintaining the balance are, however, greater in sea-water artificial tanks than in fresh-water; but by care in selecting seaweeds, avoiding those which are large and throw off much matter from their surface, and not overcrowding the water with animal life, tanks containing marine aquatic animals and plants can be easily managed. Species of *porphyra*, *chondrus*, *crispus*, *iridea edulis*, and the *delesseriæ* are recommended.—Where vegetation is only needed for the production of oxygen, Mr. Shirley Hibberd, the author of a useful handbook on the aquarium, recommends the encouragement of confervoid growth; and where sea water is used, the germs contained in it will soon, under the light and warmth of the sun, develop into a vigorous and serviceable vegetation. This, together with certain animalcules that, contrary to rule, are also oxygen producers, will be all that is needed to preserve the desired balance. The absence of direct sunlight and the presence of the *buccinum* or sea snail both serve to keep in check that fungous or mucous growth which would otherwise obstruct the vision. The fishes and crustaceous and molluscous animals should be introduced by degrees, with proper regard to maintaining the due balance of vegetable and animal life. Those which appear to thrive best are minnows, sticklebacks, shrimps, small lobsters, hermit crabs, eels, and star fishes. The *patella* or limpet, *purpura* or whelk, the top, the winkle, and several varieties of *crepidula* also do well. The more delicate sea plants, with the various forms of actiniæ, should be secured if possible attached to their native bed, as removal from it is hazardous.—The best position for either tank is between or at the side of windows, so as to avoid the direct rays of the sun. Marine animals and plants are extremely sensitive to atmospheric changes, and the salt water, which should not vary far from 60° F., should also have a specific gravity of 1·028 at this temperature. As in the fresh-water aquarium, regard must be paid to the habits and tastes of the inmates, lest the stronger overcome the weaker. All save the fishes may be best transported in damp seaweed, care being taken to pack securely and transfer rapidly. Where sea water cannot be obtained, a mixture of common salt 81 parts, Epsom salts 7 parts, chloride of magnesium 10 parts, and chloride of potassium 2 parts, may be dissolved in pure water until its gravity reaches 1·028 at 60° F. The animals should be fed twice a week with finely cut fresh mussels, oysters, or raw beef; and in case of the mollusks, actiniæ, &c., the food should be brought within reach by means of a small glass rod. Decayed vegetation or putrid animal matter must be quickly removed. When the supply of oxygen is limited, the fishes will approach the surface often to breathe.—The first aquarium having for its aim the instruction of the people was erected in the gardens of the zoölogical society, Regent's park, London, in 1853. It was made up of 25 glass tanks, 6 feet in length and 30 inches in depth and width, lining the interior of a crystal building 60 by 25 feet. The success of this effort prompted the crystal palace aquarium company to erect their building, which was opened to the public Aug. 22, 1871, at Sydenham. This mammoth aquarium with its adjuncts is nearly 400 feet long and 70 broad.

Marine Tank, Front View.


Marine Tank, Side View.

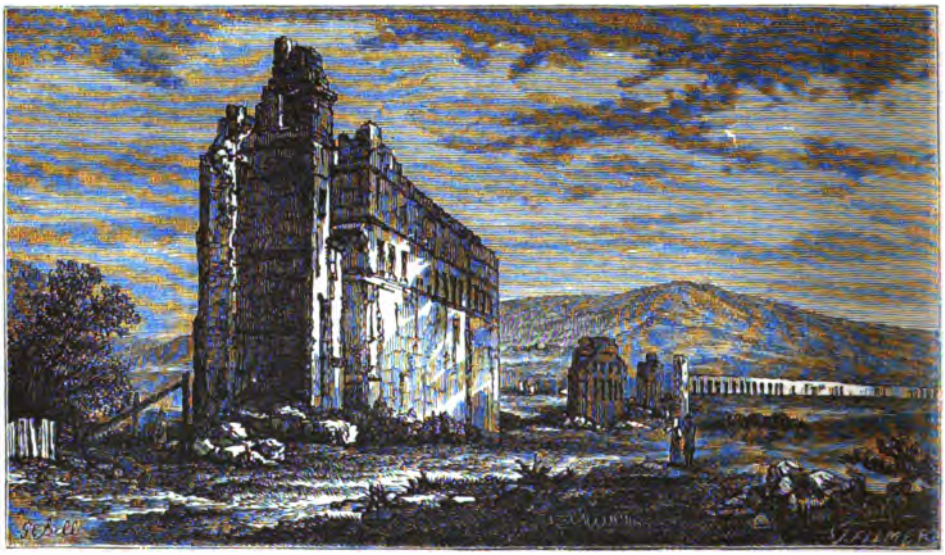
It is situated at the northern end of the palace, and is one story high, with a reservoir beneath the main saloon containing 80,000 gallons of sea water, and the tanks above 20,000 gallons—in all, 100,000 gallons, weighing 1,000,000 lbs. Eighteen tanks with plate-glass fronts range along the left of the grand saloon, separated from the wall by a narrow passage, and a row of 21 shallow tanks, the inmates of which are held as a reserve force. To the right are two small rooms with 9 shallow tanks each, in which the view is from above only; here the light is better suited to the growth of the sensitive rhodosperms (red algæ). The 18 large tanks range in capacity from 4,000 gallons in the centre to 400 on the ends of the line. The water is elevated from the main reservoir through double sets of vulcanized rubber pipes, and discharged into the two central tanks at an average rate of 6,000 gallons an hour, the stream diverging north and south and passing through the main line into the reserve and side tanks, and thence returning to the reservoir. Independently, however, of the simple fall of water from one tank to another in steps of from 3 to 6 inches in height in the series 1 to 18, other streams of water, mixed with great quantities of air in minute bubbles, are driven from the main pipe into all the tanks with force, through jets; so that myriads of such bubbles, controlled by stopcocks, are forced in a state of fine division (resembling falling sand, or steam) nearly or quite down to the bottom of each tank, and thus the fluid is charged with as much atmospheric air as it will take up in open vessels. The quantity of seaweed necessary to decompose the poisonous carbonic acid gas evolved from the animals, which could not be effected by mechanical agitation, is grown upon the rocks of the aquarium by the action of light on the spores of algæ existing invisibly in the water. These tanks contain at present 95 distinct forms of marine life. A description of this work appeared in "Nature," vol. iv., p. 469. There are extensive aquaria in the principal continental cities of Europe, those of Naples, Brussels, and Berlin being the largest.—For instructions as to the management of the aquarium, Gosse's "Handbook of the Marine Aquarium" (London, 1854), and Hibberd's "Book of the Aquarium" (London, 1856), are safe and serviceable guides. See also Rossmässler's *Das Süsswasseraquarium* (Leipsic, 1851).

AQUEDUCT (Lat. *aquæ*, of water, and *ductus*, a channel; formerly spelled *aquæduct*), a channel for the conveyance of water, or, in the more general acceptation of the word, a structure raised above the surface, upon which water conduits are laid. Methods of supplying water which do not include such structures are commonly called water works. The use of these conveyances for water to supply cities may be traced back to a very remote period in Persia and in Judea. The "pools of Solomon," near Bethlehem, were three large reservoirs connected with each other, from which water was conveyed to Jerusalem, 6 m. distant. One of these pools was 582 ft. long, and, at an average, about 180 wide. Jerusalem is still supplied with water from them through a 10-inch earthen pipe. In Egypt and Babylonia similar works were constructed in very early ages. Enough remains of the ancient aqueduct of Carthage to show that it was one of the most remarkable of these great works; upon it the waters from the mountains of Zeugis were conveyed through an arched conduit 6 ft. wide



Ruins of the Aqueduct of Carthage.

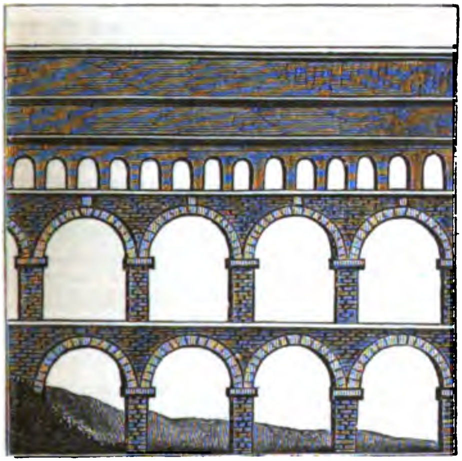
and 4 ft. deep. The whole length was 70 m. The ruin here illustrated is that of an arcade near Undena, composed of 1,000 arches, many of which were over 100 ft. in height. In its construction hydraulic cement was largely used, which is at present so solid that a single piece over 100 feet in length has fallen from the top without being broken. The ancient city of Mexico was supplied with water by the aqueduct of Chapultepec, built by Montezuma, and carried across the lake upon a causeway. But no aqueducts, ancient or modern, equal in length or in expense of labor those constructed by the incas of Peru. To irrigate their sterile soil, they brought water from the reservoirs of the mountains several hundred miles off. The aqueducts passed along the precipitous sides of the Andes, penetrating some by tunnels worked through the solid rock without iron tools, and crossing chasms upon walls and arches of solid masonry. The conduit was constructed of large slabs of freestone, which were closely fitted together without cement. The works have long since fallen to ruins.—The Romans, however, exceeded all other nations, ancient and modern, in the construction of these works. A treatise *De Aquæductibus Urbis Romæ* was written by the consul Sextus Julius Frontinus, who had the direction of the aqueducts under the emperor Nerva. He refers to nine different aqueducts, which brought into the city daily 28,000,000 cubic feet of pure water. The number of these was afterward increased to 24, some of which had several channels placed one above another, and extending many miles. They were built on a grade of regular descent, winding around the hills or penetrating them by tunnels, and in the low levels supported on arches, which sometimes, as in the New Anio, extended for 6½ m. in one continued series, many of the arches more than 100 ft. high. The whole length of this aqueduct was over 63 miles. The Aqua Martia, which extended 38 miles, contained nearly 7,000 arches. The conduits were constructed in brick or in stonework laid in cement. There were numerous openings for ventilation and cisterns for collecting the sediment, in consequence of which the water was very pure. The Aqua Julia and Aqua Tepula were conveyed into the city upon the same structure, though at a higher level. The Aqua Claudia took its rise 38 m. from Rome, and approached it by a circuitous route, being led under ground 36½ m. and along 7 m. of cut stone arcades of sufficient height to supply the hills of Rome. The capacity of all the aqueducts was wonderful in proportion to the population. Strabo said that whole rivers flowed through the streets of Rome. It is estimated that 50,000,000 cubic feet of water must have been supplied daily to a population of 1,000,000, or about 312 imperial gallons to each individual. This is about ten times the supply from the three aqueducts at present in use. The Romans built other aqueducts also in their provinces, some of which exceeded in grandeur those which supplied the capital. That of Metis (Metz) in Belgic Gaul is among the most remarkable. Extending across the valley of the Moselle, it conveyed the waters of the river Gorse to the city in such quantity that from it basins were filled in which mock naval engagements took place. The ruins of this great work still remain. There may also be cited the aqueducts of the island of Mitylene, of Antioch, of Segovia in Spain, and of Constantinople. The aqueduct of Antioch was supplied from Beit el-Ma, 6 m. distant. The illustration given is that

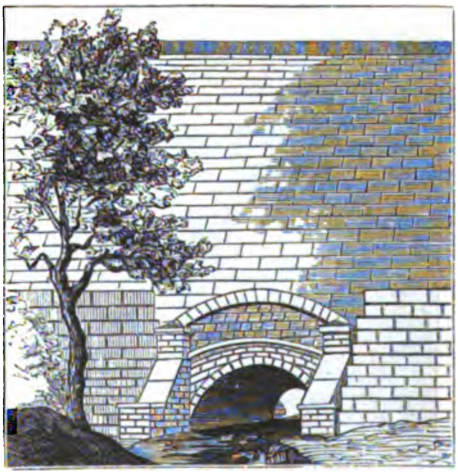


Ruins of the Aqua Claudia.

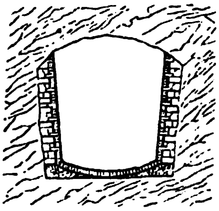
of a portion of one of the main bridges, 700 ft. long and 200 ft. high. Though solidly built, it is yet the rudest example of Roman work, and contrasts strangely with the bridge of the aqueduct of Nîmes, or Pont du Gard, across which the waters of the river Hure were led. This bridge spanned the valley of the river Gard by a triple row of arches, the first six having a span of 60 ft. each; above these were 12 similar ones; while the upper row was composed of 36 smaller arches arranged as in the illustration, the whole forming one of the finest examples of Roman architecture. In 1740 the engineer Pitot built a roadway beside this aqueduct and level with its lowest tier of arches. The aqueduct of Spoleto is of uncertain origin. One of the bridges is 810 ft. long, and the main arches are 240 ft. high. This work remains entire. Though the Romans constructed their aqueducts so as to obtain a gradual descent, it is evident that they were not compelled to do so from ignorance of other methods. Prof. Leslie obtained a lead pipe supposed to have been used at the baths of Caracalla; and Delorme states that the waters from Mount Pila crossed three valleys through inverted syphons. The water was collected in a reservoir upon one hill and conducted through nine lead pipes 8⅛ in. in diameter and 1$\frac{1}{12}$ in. thick down the hillside, thence along an arcade 80 ft. high, and up the opposite slope, where it was discharged into a second reservoir. It is estimated that the lead alone used in these three inverted syphons would now be worth $2,500,000. In modern aqueducts the system of gradual descent is only partially followed, the use of cast-iron pipes admitting of frequent changes in the inclination. —In the reign of Louis XIV. an aqueduct of vast expense was constructed for supplying Versailles with water. The bridge of Maintenon, built for supporting this aqueduct, is about 4,400 ft. or ⅞ of a mile long, upward of 200 ft. high, and is constructed of three tiers of arches, 242 in each tier, and of a span of 50 ft. The aqueduct for supplying Marseilles is a canal 60 m. long. It passes through several chains of limestone mountains by 45 tunnels, the united length of which is 8⅛ m., and across a ravine 5 m. from Aix by a structure of masonry 262 ft. high and 1,287 ft. long. The quantity of water that flows through it is 198,000 gallons per minute. The Lisbon aqueduct, completed in 1738, is about 3 leagues in length, and in some parts of its course has been excavated through hills; but near the city it is carried over a deep valley for a length of 2,400 ft. by several bold arches, the largest of which has a height of 250 ft. and a span of 115 ft.—The Croton aqueduct of New York surpasses all modern constructions of this kind in extent and magnificence. It was completed in 1842, having been five years in building, under the superintendence of Mr. John B. Jervis, chief engineer. The whole expense,

Aqueduct of Antioch.

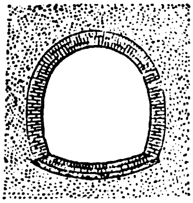

Pont du Gard, Nîmes.


Croton Aqueduct, crossing Mill River.

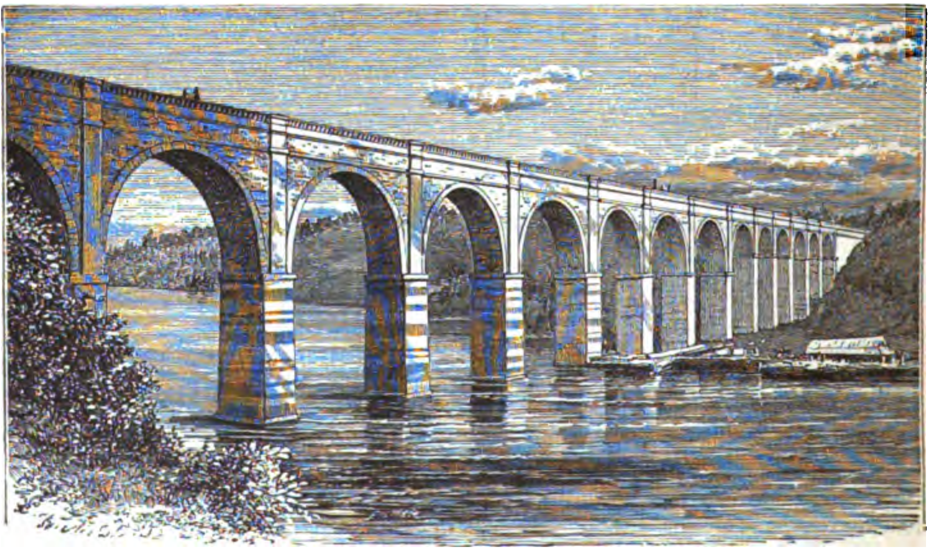
including $1,800,000 for distributing pipes, and amounts paid for right of way and other incidental charges, was $10,375,000. Including commissions and interest, the whole cost was $12,500,000. The whole length, from its source at Croton river to the distributing reservoir on 5th avenue and 40th street, is 40½ m. On this line are 16 tunnels having an aggregate length of 6,841 ft., and cut mainly through gneiss rock. A large part of the open cutting is also rock work. A dam constructed across the Croton river raised the water 40 feet, and formed the Croton lake, which covers about 400 acres. This is the collecting reservoir, and contains with a depth of 6 ft. of water 500,000,000 gallons. A new collecting reservoir is (1873) in course of construction at Boyd's Corners, Putnam county, to be formed by building across the west branch of the Croton river a dam 700 ft. long and of sufficient height to secure a storage capacity of 3,000,000,000 gallons, flooding over 300 acres of land. From the dam to the Harlem river, nearly 33 m., the aqueduct is built of stone, brick, and cement, arched over and under, 6 ft. 9 in. wide at the bottom (this being the chord of an arc, the versed sine of which is 9 in.), 7 ft. 5 in. at the springing line of the arch, and 8 ft. 5½ in. high; area of cross section, 53¼ sq. ft. In rock tunnels the roofing arch is dispensed with, though the bottom and sides are as here described and illustrated. Its capacity is equal to 115,000,000 gallons daily. The inclination is 1·1088 ft. per mile, or 33·92 ft. in the 33 m. The velocity of the water is 1½ m. an hour. Across Harlem river the aqueduct is carried upon the High bridge in two cast-iron pipes of 3 ft. diameter, and one wrought-iron pipe 7 ft. 6 in. in diameter, recently laid over the former. The lower pipes are 12·29 ft. lower than the bottom of the conduit on the N. side of the river, and 10 ft. below the aqueduct on the S. side. While the bridge was building, the water was conveyed in a 3-foot iron pipe down one bank of the river and up the other, and the original intention was to have had this for the permanent plan. Objections being raised that the pipe would obstruct the navigation of the river, and restrictions being imposed by the state legislature as to its use, it was finally decided to build a bridge with arches 80 ft. wide and openings 100 ft. high, to admit the passage of vessels. The bridge, as now completed, is 1,460 ft. long, with 8 arches in the river of the required span, and 7 others on the banks of 50 ft. span. The whole height of the bridge above high-water mark is 116 ft. There are two receiving reservoirs in the Central Park, known as the old and the new. The former covers an area of 35 acres and has a capacity of 150,000,000 gallons; the latter 100 acres, with a capacity of 1,030,000,000 gallons. From these reservoirs to the distributing reservoir, a distance of 2¼ m., or directly into the city, the water is conveyed in two lines of iron pipe 30 in., two lines 36 in., and one line 48 in. in



Rock Tunnel

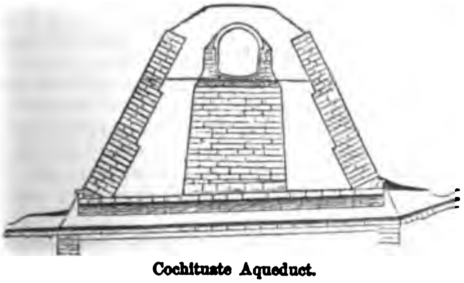


Main Aqueduct.



High Bridge, Harlem River.

diameter. The capacity of this distributing reservoir is 20,000,000 gallons. It is a stone structure 45 ft. high above the streets, and 425 ft. square at the top, covering a little more than four acres. The higher sections of the island lying north of Manhattan valley are supplied from a reservoir and tower lately erected on the high ground near 173d street, between 10th avenue and the aqueduct. The water for the supply of this high service reservoir and the adjacent tower tank is furnished by two pumping engines stationed near the lower end of the high bridge. (See Water Works.) In 1871 the average daily demand was 85,000,000 gallons, which is taken mainly from the distributing reservoir and conveyed through the city in 340 m. of iron pipe ranging in diameter from 4 ft. to 4 in.—The cities of Brooklyn and Jersey City receive their water supply, the former from several ponds from 8 to 14 m. distant, and the latter from the Passaic river, 8 m. distant. In both cases the water enters the city upon such a level as to require the use of pumping engines for its distribution. For the plan and capacity of these engines, as also of those in operation at the famous Fairmount water works, Philadelphia, see Water Works. The aqueduct which supplies the city of Boston leads from Cochituate lake to the receiving reservoir at Brookline, a distance of 14½ m. For the greater part of the way it is a conduit of brick masonry. Over the valley of Charles river is a line of iron mains, and in Newton and Brookline are two tunnels. The brick conduit winds by irregular curves along the country, and is of such an elevation as admits of the work being mostly beneath the natural surface. The brickwork is 8 in. thick, laid in hydraulic cement, the section of the conduit being that of an egg, the larger end down. The greatest width is 5 ft. and the extreme internal height 6 ft. 4 in. This aqueduct is everywhere covered by at least 4 ft. of earth, and nowhere admits of a passage underneath, except by culverts at the crossing of Charles river and at a bridge over a valley in Needham. The two 30-inch iron pipes cross the river upon a stone bridge at a level 71 ft. above low-water mark. The whole length of each pipe is 979 ft. The tunnels are in porphyritic rock of great hardness, one 2,410 and the other 1,150 ft. in length. The city of Washington is supplied with water through an aqueduct constructed by the national government, 18 m. long, leading from the Potomac falls to the receiving reservoir at Chain Bridge. On the line of this work are 11 tunnels and 6 bridges; the chief of these, over Cabin John creek, is a stone structure 100 ft. high and having a single span of 220 ft. The whole cost of the work exceeded $3,000,000. The Chicago lake tunnel, through which the waters of Lake Michigan are led into that city, was commenced March 17, 1864, and completed under the supervision of city engineer E. F. Chesborough, March 8, 1867. (See Tunnel.)—Though the Croton aqueduct is at present the greatest work of its kind in the United States, others have been projected which, if brought to successful completion, will far surpass it. Among these is the plan of supplying the city of San Francisco from Lake Tahoe, a mountain reservoir of great depth and purity, located upon the boundary line between California and Nevada, and distant from San Francisco about 150 m. It is also now proposed to construct an aqueduct from Lake George to the city of New York, a distance of over 200 m., the conduit to be of sufficient size to supply the many cities and villages along the route.—In addition to the structures mentioned above, there are numerous bridges designed for the conveyance of canals across rivers and valleys. The first of these canal aqueducts built in England was constructed by the architect Brindley, under the supervision of the duke of Bridgewater. Upon it the Lancaster canal crossed the river Lune. It was composed of 5 arches of 72 ft. span each, with an average height of 65 ft. above the level of the river. The Forth and Clyde canal crosses the valley of Kelvin upon an arcade somewhat higher, though of not so great length as that across the Lune. The Pont-y-Cysyllte aqueduct conveys the waters of the Ellesmere canal across the vale of Llangollen in Wales. This bridge is 1,000 ft. long, built with 19 arches, each having a span of 45 ft. The canal level is 126 ft. above that of the river below. In the United States there are many structures of this character, those on the Erie canal alone numbering 32. The chief of these are the two crossing the Mohawk river, the Richmond aqueduct over the Seneca river, and the stone arcade across the Genesee at Rochester. The larger of the two Mohawk bridges, crossing the river at a point 14 m. N.W. of Albany, consists of a wooden trunk resting upon 29 stone piers; it is 1,300 ft. long, and cost $331,000. The Richmond aqueduct is a beautiful stone structure 894½ ft. long, the water being also conveyed in a wooden trunk. For beauty and strength, however, the aqueduct bridge across the Genesee river at Rochester deserves special mention. It is a solid stone structure 920 ft. long, supported upon 6 cut stone arches of 52 ft. span. It is in the centre of the city, and was erected at a cost to the



Cochituate Aqueduct.

state of $500,000. Gold mining in California has necessitated the construction of running wooden and iron aqueducts, called mining ditches, some of which are more than 100 m. long.

AQUILA, a fortified city of Italy, capital of the province of Abruzzo Ulteriore II., on the Aterno, 56 m. N. E. of Rome; pop. about 12,000. It was built by the emperor Frederick II. in 1240, from the ruins of the ancient Amiternum, the birthplace of Sallust. It was much reduced by earthquakes in 1688, 1703, and 1706. It has a large number of churches and monastic houses.

AQUILA, Kaspar, a German reformer, who thus Latinized his name Adler, born in Augsburg, Aug. 7, 1488, died in Saalfeld, Nov. 12, 1560. He studied theology in Germany and Italy, became chaplain of Franz von Sickingen, and in 1519 was imprisoned by the bishop of Augsburg for preaching and writing in favor of Lutheranism, and was released only on the interposition of the queen of Denmark. He passed several years in Wittenberg as a preacher and teacher, and in assisting in Luther's translation of the Bible. His publications against the Interim, *Christliches Bedenken auf das Interim* and *Das Interim illuminirt* (1548–'9), caused the emperor to offer a high price for his capture.

AQUILEIA, a village of the Austrian Coastland, circle of Görz, a few miles from the Adriatic and from the Italian frontier. It occupies a portion of the site of ancient Aquileia, a city founded about 182 B. C. by the Romans at the E. extremity of Transpadane Gaul, as a defence against the northern barbarians; or possibly somewhat earlier by the Gauls, in which case, however, it soon fell into the hands of Rome. It is said to have derived its name from *aquila*, an eagle, which appeared as a favorite omen to its founders. It was a powerful military post in the time of Cæsar. In Strabo's time it was the great emporium of Roman trade with Rhætia, Noricum, Pannonia, Istria, and Dalmatia, roads running from the town into those countries. Maximin laid siege to Aquileia, but, failing in the attempt to take the place, he was slain by his own soldiers, A. D. 238. In 452 it was taken by Attila, and razed to the ground; its inhabitants fled to the lagoons on which Venice now stands. It was afterward retaken from the Huns by Narses and partly rebuilt. It was an important episcopal see, and several councils were held there. The bishops of Aquileia assumed in the 6th century the title of patriarch, and for several centuries carried on a contest with the popes, who in opposition to Aquileia established the patriarchate of Grado. The patriarchate of Aquileia was not abolished till 1751. In the middle ages the place gradually dwindled down to a state of entire insignificance.

AQUINAS, Thomas, a saint and doctor of the Latin church, surnamed the Angelic Doctor, born according to some authorities at Aquino in the kingdom of Naples in 1224, according to others at Belcastro in 1226, died at the Cistercian abbey of Fossa Nuova, in the Pontine marshes, March 7, 1274. His father was count of Aquino, and allied both by blood and marriage with several of the royal families of Europe. At an early age he was intrusted to the care of the Benedictines at Monte Casino, and thence he was transferred to the university of Naples. From the first he showed an inclination to the monastic life, and in 1243 he received the habit of the Dominicans. His relatives were opposed to this proceeding and imprisoned him in a tower of his father's castle, whence, by the help of one of his sisters whom he had converted, he escaped, and was allowed to resume in peace his convent life. In company with the general of the Dominican order, he went to Cologne, where he became a pupil of Albertus Magnus. The nickname of Dumb Ox, which his fellow students gave him from his size and silence, gave occasion to his master one day to exclaim when the promptness and acuteness of his answers had astonished them all, "This dumb ox will give such a bellow in learning as all the world shall hear." In 1248 Thomas was appointed to teach ethics at Cologne; and four years later he was teaching theology at Paris. His school was thronged with students, and crowds waited upon his preaching. In 1261 he was recalled by Urban IV. to Italy, and became a constant attendant and friend of this most active of popes, teaching in the more important places of central and southern Italy, particularly in Naples, Rome, Bologna, and Pisa. He was on his way to the council at Lyons, to sustain the cause of the Latin against the Greek church, when he was seized with his fatal illness. Less than 50 years afterward, in 1323, he was canonized, and the day of his death was appointed as the day of his festival. He is ranked with the four great doctors of the western church. The works of St. Thomas have always had high authority, and large use is still made of them in Catholic theological study. They form 17, 19, and 20 folio volumes, in the various editions from 1490 to 1745. The three volumes of the *Summa Theologiæ* may be regarded as the most finished compend of scholastic divinity. —See "Life and Labors of S. Thomas of Aquinas," by Roger Bede Vaughan (2 vols., London, 1872).

AQUITANIA, the southwestern division of ancient Gaul, situated between the Garonne, the Pyrenees, and the bay of Biscay. It was the smallest of the earlier divisions of Gaul, and Augustus, in order to equalize it in some measure with the other two, extended its frontier to the Loire. The language, institutions, and physical conformation of the Aquitani were different from those of the other inhabitants of Gaul, and proclaimed their affinity with the Iberian tribes of the Spanish peninsula. Aquitania, or Aquitaine, was an independent duchy under the Merovingian and Carlovingian dynasties, though Charlemagne reduced it to temporary subordination. By the marriage of Louis VII. with Eleanor of Aquitaine, it became united to the French monarchy in 1137; but 15 years later the same princess, having been divorced from Louis, married Henry Plantagenet (afterward Henry II. of England), and transferred the possession of Aquitaine to her new husband. The title to the duchy was disputed by England and France for many years, but Charles VII. finally reunited it to the French crown in 1453. In the 13th or 14th century the name became corrupted into Guienne. (See Guienne.)

ARABELLA STUART. See Stuart.

ARABESQUE, a kind of ornamentation, either sculptured or painted, which was at first a characteristic of Moorish architecture, but has in modern times been largely used in decorations of every style. It consists of fantastic combinations of flowers, fruits, branches—of almost any graceful and beautiful objects which may be intertwined with one another in a variety of forms, or in constant repetitions of a single pattern. The Alhambra, as the best preserved specimen of Moorish architecture, is particularly rich in arabesques, and those here illustrated are taken from its walls. Raphael employed arabesques in the ornamentation of the Vatican, and of late years Kaulbach has often used them in fresco painting; while in the ordinary decoration of rooms and buildings they have become one of the most common methods of embellishment.

ARABGIR, Arabgheer, or **Arabkir,** a town of Asia Minor, in the eyalet and 102 m. E. S. E. of Sivas, on the caravan road from Aleppo to Trebizond; pop. about 30,000, one fourth of whom are Armenians, and the rest Turks and Turcomans. The prosperity of the town is due to the caravan trade and to the cotton industry of the Armenians. Fruit trees surround the town, especially the white mulberry, whose fruit is eaten fresh and also used for making brandy and sweetmeats. Wheat is successfully cultivated, and iron ore abounds in the surrounding highlands.

ARABIA (by the Arabs called *Jeziret el-Arab*, the island or peninsula of the Arabs), a peninsula forming the S. W. extremity of Asia, between lat. 12° 40′ and 34° N., and lon. 32° 30′ and 60° E., bounded N. by Palestine, the Syrian desert, and the Euphrates, E. by the Euphrates, Persian gulf, and gulf of Oman, S. by the Indian ocean and the straits of Bab-el-Mandeb, and W. by the Red sea, the gulf of Suez, and northern Egypt. It is about 1,500 m. in length from near Anah on the Euphrates to the straits of Bab-el-Mandeb, and 900 in breadth from Suez to Bassorah. The S. coast is 1,200 m. long. Area estimated at somewhat more than 1,000,000 sq. m. Its northern limits can hardly be defined with accuracy, owing to the fact that the vast arid deserts of Syria and Arabia blend into each other without any distinct landmarks. Burckhardt represents the boundary as extending from the shores of the Mediterranean near El-Arish along the southern border of Palestine and the Dead sea, thence winding across the Syrian desert to Palmyra, and crossing in a straight line to the Euphrates at Anah. The ancient geographers divided Arabia into three parts. Arabia Petræa or the Rocky occupied the mountainous tract between Palestine and the Red sea; Arabia Deserta or the Desert extended eastward and southward from Petræa to the Euphrates and the Persian gulf, comprising the great desert; and Arabia Felix or the Happy occupied the shores of the Red sea and the Indian ocean. These divisions, however, have always been unknown to the inhabitants themselves. The modern divisions are: 1. The Bahr el-Tur Sinah or Sinaitic peninsula of Petermann, the El-Hadjr of Von Hammer, comprising the small peninsula between the Mediterranean and the two northern arms of the Red sea, and corresponding very nearly to the Arabia Petræa of Ptolemy. 2. Hedjaz, or the land of pilgrimage, commencing S. of the above, extending along the Red sea to the parallel of 19°, and bounded E. by the great central desert. It is a barren district, consisting of sandy plains toward the coast and rocky hills in the interior; the inhabitants depend for a livelihood mainly on the gains from Moslem pilgrims. Some places, as Wady Fatimeh and Taif, are well watered and produce grain and vegetables. The chief commercial ports and cities are Jiddah and Yembo, and the two sacred cities of Mecca and Medina are also in this division. The viceroy of Egypt is nominally the ruler of this territory, but the Beled el-Haram or holy land proper, including the two sacred cities, is under the peculiar jurisdiction of the sherif of Mecca. The Howeitat Arabs, a fierce and dangerous tribe, control the coast from the 25th parallel northward. 3. Yemen, occupying the remainder of the Red sea coast, and forming part of Arabia Felix. It comprises the finest and most fertile portion of the peninsula. Toward the sea the soil is scorched and barren, but the interior is a highland country, of precipitous though fertile hills, and a healthy climate. Its extent is about 80,000 sq. m., and it is governed by several petty sovereigns or chiefs. Its principal towns are Sana, Mocha, and Loheia, and it is in this province that the celebrated Mocha coffee is raised. The stronghold and port of Aden, an Asiatic Gibraltar, now belonging to Great Britain, is in this district. The Tehama is a sandy belt extending along the Red sea nearly from Akaba to Aden, and stretching backward to the mountains, varying in breadth from 30 to 60 miles. It bears many marks of having anciently formed part of the bed of the sea, and various marine fossils are to be found in the soil. As the sea gradually recedes and leaves the coral banks exposed, these are soon filled up by the sands. This tract is of no service to man; it contains vast strata of salt, and the sandy soil is wholly incapable of cultivation. 4. Hadramaut, forming the great southern portion of Arabia. It extends along the Indian ocean from lon. 45° to 54° 30′, and stretches far into the interior. The mountains on the coast, brown and bare, rise in several ranges behind each other to the height of 1,000 or 1,500 feet, intersected by well watered and fruitful vales. Beyond is the Dahna or great sandy desert, which covers the greater portion of central Arabia. Hadramaut contains about 20 towns; its harbors are Makalla, Dafar, Merbat, and Hasek. The inhabitants are a thriving and commercial people, and the country was formerly famous for producing frankincense. 5. Oman, occupying the tract lying between the Persian gulf and the Indian ocean, and having for its western boundaries the district of Hadramaut and the great central desert. It is a very mountainous region, and toward the sea presents the same appearance as Hadramaut. It is divided among several petty chiefs, the most powerful and enlightened of whom is the imam of Muscat, as he is called by English and Americans, but whose proper title is sultan of Oman. His efforts to extend the commerce of his country with foreign nations have given him considerable reputation. He claims the greater part of the seacoast. Between Oman and Hasa is a tract called Menasir and the cape of Katar. This portion is dreary, sun-scorched, and nearly destitute of vegetation. The bay of Bahr el-Banat, on which it borders, contains the best and most copious pearl fisheries in the Persian gulf, and is a source of considerable wealth to the inhabitants. 6. El-Hasa or Ahsa, extending along the W. coast of the Persian gulf, between Katar and Irak Arab, and the Euphrates. It is partly mountainous and partly level. This district is subject to occasional shocks of earthquake, and almost all the springs are warm with a slightly sulphurous taste, and the rocks are of tufa and basalt. A bath was built at one of these hot sulphur springs and frequented by invalids for many years; but when the country fell into the hands of the Wahabees, they destroyed it from superstitious motives. The products of Hasa are fine wool, cotton, rice, wheat, dates, sugar cane, and almost all the leguminous plants. Cloaks, shawls, gold lace, swords, and daggers are manufactured here. The chief towns are Hofhuf and Katif. The Wahabee chieftains have greatly reduced the commerce and manufactures of Hasa by drafting merchants and artisans into their army. 7. Nedjed or Nejd, the central and largest of the divisions of Arabia, is traversed from N. E. to S. W. by a range of mountains, forming a plateau about 3,000 feet above the level of the sea. This plateau is intersected by numerous fertile valleys, bordered by steep and often precipitous banks; in these are built the villages and towns. In the E. part of this region iron ore is found in considerable quantities; and in the west, in Jebel Toweik, are both iron and copper. The best breed of Arabian horses is produced in Nedjed. Riyad is the capital of the Wahabee monarch. Nedjed is separated from Hasa by a tongue of the Dahna, the great desert. The monarch or chief of Nedjed has subjected Hasa on the east, lower Kasim on the northwest, and the surrounding Bedouin tribes. The population of Nedjed and Hasa, including the Bedouin tribes, is computed at about 1,300,000. 8. Shomer, consisting of three mountain ranges running N. E. and S. W. nearly parallel to each other, Jebel Adja, Jebel Solma, and upper Kasim. These, with lower Kasim, which belongs to the chief of the Wahabees, are separated from Nedjed by a strip of desert. Between these mountain ranges extend broad plains covered with grass and shrubbery, which afford excellent pasturage for cattle. Grain, dates, and other fruits are raised in the mountains, and water can be found almost everywhere by digging a few feet beneath the surface. Hayel, the capital, is a walled and fortified town of about 20,000 inhabitants, situated almost in the heart of the province. It has of late years distinguished itself by encouraging commerce, subduing the marauding Bedouin tribes around, and rendering travel more secure. Another wide expanse of sand lies between Shomer and Wady Jowf and Wady Serhan on the north, the former a fertile valley and the latter a barren sandy depression. Both are under the jurisdiction of the prince of Shomer. Beyond this commences the Syro-Arabian desert. West of Nedjed and Shomer is another expanse of desert that separates these two districts from Hedjaz and Yemen. The more habitable parts of the Syro-Arabian desert are occupied by various Bedouin tribes—the Beni Lam on the east, and the Howeitat, Sherarat, and the Edwan (once a very powerful tribe, but now greatly reduced in numbers) on the west. Von Hammer adds to these two other divisions: Esh-Shehr, or Mahra, E. of Hadramaut proper, a dreary region, but containing some well cultivated and well inhabited districts, and occupied by a people whose language differs materially from the modern Arabic; and El-Yamamah, the S. E. portion of Nedjed, bordering on El-Hadjar, Oman, and the great desert. The latter has been designated above as the district of Katar and Menasir, famous for its pearl fisheries.—The S. and S. E. portions of Arabia consist of an immense waste of sandy desert, the Dahna or Robat el-Kholy, "the abode of emptiness," which covers about one third of the entire peninsula. The sands, generally of a reddish color and thrown up into mounds by the winds, present to the eye the appearance of a fiery sea suddenly solidified. There is a very strong resemblance, in almost every particular, between the Arabian desert and the African desert of Sahara. Ophthalmia is common in Arabia, owing probably to the irritation produced upon the eye by the glare of the sand, and its almost constant presence in the atmosphere. A species of leprosy known as Arabian elephantiasis is also prevalent, and is attributed to the bad quality of food and water. The plague has occasionally visited the coast, but never penetrated into the interior. A remarkable phenomenon in the central portions of Arabia, especially those bearing evidence of volcanic action, is the sand gulfs described by Baron von Wrede. These are large pits filled to the brim with a whitish impalpable powder. Von Wrede cast into one of them a sea lead, which sank so rapidly that he was obliged to let go the line, which, though of considerable length, instantly disappeared.—Palgrave is of opinion that the watershed of central Arabia bears from N. N. W. to S. S. E. between lon. 45° and 46° E. and lat. 29° and 24° N. Its greatest altitude is behind Jelajel in the province of Sedeyr in Nedjed, whence it gradually declines till lost in the southern desert. On each side of this ridge to the south also Arabia slopes coastward to the Persian gulf, Indian ocean, and Red sea, though with some local interruptions. The Sinaitic peninsula is traversed by spurs from the Lebanon range. Mt. Seir and Tur Sinah (supposed to be Mt. Sinai) are its principal summits. Of the many islands which border the coast, the Bahrein isles in the Persian gulf and Socotra in the Indian ocean are the only important ones. Arabia has no considerable river. Its streams, taking their rise in the mountains, lose themselves for the most part in the sands, or form deep ravines called by the natives wadys; they reach the sea only when swollen by the rains. The Sehan and the Kebir flow into the Red sea; the Meitan and the Moseira into the Indian ocean. Several of these are said by recent geographers to pursue a subterraneous course, for which the dense clay which underlies the sand, and the cavernous limestone, afford facilities, and to discharge into the sea at some distance from the shore. A recent German traveller relates that at certain points near the coast the sailors would spring overboard with their goat skins, and diving down would bring up fresh water from springs below the surface of the sea. In many parts little or no rain falls throughout the year. On the W. coast rains are periodical, occurring from June till September. On the S. and E. coasts, on the contrary, they occur during the winter months.—In the desert the thermometer is generally above 100° F. during the night, 108° in the morning, and in the course of the day it rises to 110° and sometimes higher. The climate of Mecca is sultry and unwholesome; at Medina it is much colder in winter and hotter in summer. At Mocha it averages from 90° to 95° in July; in Muscat from 92° to 102° during the day. In Petræa the diversity is much greater, the maximum in the upper regions being 75° in May, and in the lower country, particularly on the seashore, 102° to 105°, and sometimes 110°. In the desert, near the Euphrates, Griffith observed that it rose to 132° under his tent and to 156° when exposed to the sun's rays.—The mountains consist of porphyry, jasper, quartz, sandstone, alabaster, basalt, marble, and limestone. The minerals are blue alabaster, agates, carnelians, tourmalines, the emerald, the onyx, gypsum, saltpetre, sulphur, naphtha, asphaltum, iron, lead, and copper. Gold was formerly obtained in Yemen, but the supply has long been exhausted. Mines of iron, lead, copper, and rock salt are still worked.—Although but a small portion of Arabia is susceptible of cultivation, its vegetable productions have always been greatly famed. The date and other species of palm stud the oases of the desert. In Yemen the coffee tree yields the small Mocha berry. The balm tree (*amyris opobalsamum*), which furnishes the fragrant balm of Mecca, the *acacia vera*, which produces the gum arabic of commerce, the *cassia fistula* or purging cassia, the aloe, and the *olibanum* or frankincense, are the most valuable of the products of the soil. The durra (*sorghum vulgare*), a species of millet, which furnishes the chief article of food to the village Arabs, the sugar cane, wheat, barley, beans, rape, lentils, melons, gourds, oranges, lemons, pears, quinces, apricots, almonds, peaches, grapes, tamarinds, and cocoanuts form the bulk of the other productions of the country. The methods of agriculture adopted by the Arabs are extremely rude, but owing to their industry, and the porous and friable character of the soil, which only needs water to make it yield abundantly in the more fertile regions, they succeed in raising very good crops. In many parts of Yemen ploughing is not attempted, but the ground is cultivated with a crowbar and hoe, as substitutes for the spade. Throughout nearly the whole country which is under cultivation, artificial irrigation is practised. At Muscat wheat and barley are sown in December and reaped in March.—The horse is supposed by some to have originated here. The camel and the dromedary are natives of the Arabian deserts. The ass also originated in this country, and the onager or wild ass, though perhaps a different species, still roams in the deserts of Nedjed. There is a race of oxen with a hump on the shoulders. The broad, thick-tailed sheep is common, but its wool is coarse, and its flesh not delicate. Among wild animals, the rock goat or ibex, gazelle, antelope, and jerboa are very abundant; and in the interior the hyena, panther, ounce, jackal, wolf, fox, wild boar, and wild cat exist. There are many species of apes, some of which cause great damage to the coffee plantations of Yemen. Among rapacious birds are found one or more species of the eagle, falcon, heron, owl, and ostrich. The partridge, guinea fowl, and pheasant are also found in different districts of the country. Fish abound on all the coasts, and on that of Oman the *pinna marina*, or pearl oyster, is found in large quantities. Reptiles are very numerous, including tortoises, many species of lizards (some of which, like the *guaril*, are of great size, and are used for food), serpents, and batrachians. The locusts often destroy the crops, and many other insects inflict serious injury upon men or animals.—For many centuries the Arabians monopolized, in connection with their neighbors of Phœnicia, the greater part of the carrying trade of the world; and even when the Venetians, Portuguese, and Dutch had entered into competition with them, they still retained the trade between India and Europe. The doubling of the Cape of Good Hope by the Portuguese was the signal for a rapid decline in their commerce; but the opening of the overland passage to India in recent times gave it a new impulse. The principal exports of Arabia are coffee (much of which is brought to Muscat, Mocha, and Jiddah from Abyssinia, Nubia, and Egypt, and exported thence as genuine Mocha coffee), dates, gum arabic, myrrh, aloes, almonds, balm of Mecca, frankincense, some aromatic and medicinal drugs, and pearls. The traffic in pearls is almost entirely in the hands of the banians, or Hindoo merchants. From Muscat, wheat, horses, raisins, salt, dried fish, and drugs are also exported. Arabia receives from Europe silver, iron, copper, lead, firearms, and gunpowder; from Abyssinia, slaves, sheep, elephants' teeth, and musk; from the E. coast of Africa, gold, slaves, amber, and ivory; from Egypt, rice, lentils, sugar, and oil; from Surat, linen; and from Coromandel, cotton. — The population of the Arabian peninsula has been variously estimated at from 10 to 15 millions. The latter is probably the nearest to the truth, as recent explorations demonstrate that the interior contains more fertile lands and a denser population than was formerly supposed. It is estimated that the various races and tribes known collectively as Arabs comprise nearly seven eighths of this population; the remainder consists of Hindoos, Turks, negroes, Abyssinians, Jews, Persians, and Franks. Of the settled Arabs there are many distinct tribes, differing so much in manners, habits, and language as to give the impression to the traveller that they originated from different stocks. The discoveries at several points in the interior of Himyaritic inscriptions, and the existence of a language spoken by the natives of the interior villages called Ehkili, bearing a much stronger analogy to the Himyaritic than to the Arabic, would seem to indicate that a portion of the fixed Arabian population are descendants of those Hamites who originally settled in Syria, Phœnicia, and the adjacent countries. The fixed Arabs are as a general rule, and especially in the northern parts, indolent, improvident, deceitful, treacherous, and prone to robbery. But at the same time they are courteous, sociable, easy in their manners, and intelligent, and the lower classes are superior to those of a corresponding grade in more civilized countries. The Bedouins are, probably with less admixture than the inhabitants of the towns and villages, of Semitic race. They speak the Arabic language with great purity and force, and subsist by rearing cattle and by plunder. (See BEDOUINS.)—Mohammedanism or Islamism is the prevalent religion of Arabia, though according to recent travellers the people are generally less devout and more inclined to skepticism than those of any other Mohammedan country; and among the inhabitants of Wady Doan, a large and populous valley in the interior of Hadramaut, Von Wrede found traces of the ancient fire worship; while M. Arnaud in 1848 found among the mountains of Yemen many Arabs whose reverence for Hud, a prophet who preceded Mohammed and who cursed him and his followers, was much stronger than that for the prophet of the Koran.—The Arabs claim descent from Kahtan or Joktan, of the posterity of Noah by Shem, and from Ishmael. Ishmael, according to their tradition, was prince and first high priest of Mecca, and his posterity ruled the city for 14 generations. Joktan or Kahtan was the first king of Yemen. His successors reigned 2,000 years in that country. Saba, the fourth after him, built the capital and called it after his name; hence the Sabæans. He converted one of the valleys in his territory into a large lake, five leagues in length, by constructing a mole or bank across its lower extremity. The water was thence conducted to the fields, gardens, and houses of the inhabitants, and the lands thus irrigated became very productive. Bilkis, one of the queens of Yemen, according to the Arabs, was the famous queen of Sheba who visited Solomon. From her designation queen of the south, and the description of her presents to Solomon, gold and spices, there is little doubt that Arabia, and Yemen in particular, was the native country of this princess. The French traveller T. J. Arnaud, who visited this region in 1848, found among the ruins abundant evidence of its former greatness in the massive blocks of stone covered with inscriptions in the Himyaritic character, and in the ruins of buildings and temples which must have once approached in magnificence those of Palmyra or Tadmor. Himyar, the immediate successor of Saba, is supposed to have been the founder of the city of Mareb, and to have invented the Himyaritic characters. After an inundation caused by the bursting of the immense reservoir built by Saba the tribes of this kingdom were scattered, and were not again united till a century later under Tobba I., about A. D. 175. Under him and his successors Yemen rose to more than its ancient splendor. Assad Abukarb (220) invaded and subdued Tehama, defeated the Tartars in Azerbijan, plundered many cities of Khiva, and seems to have carried his arms into Bokhara. Tobba II. in 297 invaded Hedjaz and besieged Yathreb (now Medina), a city inhabited by Jewish refugees after the destruction of Jerusalem. While there he was converted to Judaism, and on his return home all the nation embraced the Mosaic faith. Dunawas in 480 was a furious persecutor of the Christians, and is said to have burned 20,000 of them in a pit filled with combustibles. The Christian king of Abyssinia sent an army under the command of his son Arayat, with orders to slay every Jew and plunder the country. Dunawas was routed, and cast himself into the sea, and the race of the Himyarite princes became extinct. Arayat was confirmed in the government of Yemen, and the Abyssinians ruled it for 72 years, until Seif, a descendant of the Himyarites, obtained from Chosroës, king of Persia, an army with which he wrested the power from the hands of the Abyssinians. He was appointed viceroy of the king of Persia, to whom he paid an annual tribute. After Seif's assassination by an Abyssinian slave, Yemen was governed by Persian satraps under the title of emirs till it was subdued by the lieutenants of Mohammed.—The kingdom of Hira in Irak was founded by some of the dispersed clans after the inundation in Yemen. Numan I., about A. D. 400, signalized himself by his conquests in Syria, building numerous vessels on the Euphrates, and adorning the capital with palaces, gardens, and hunting parks. Numan is said to have become a convert to Christianity and abdicated the throne to live in retirement. Mundar II., who reigned about 493, proved a valuable ally to the Persian monarch Kobad in his successful invasion of the Roman territories. In the reign of Mundar V. (633) the kingdom of Hira was invaded and subdued by the lieutenants of Mohammed. Other colonies of Arabs migrated northward into the territory of Damascus, where they founded a dynasty of kings called the Gassanites. Several small principalities existed in those districts before their arrival, the chief of which was the tribe of Silh, who had become converted to Christianity, in consequence of which the Roman emperor invested them with the government of the Syrian Arabs. These the emigrants (the tribes of Aus and Khasraj) expelled, slew many of their petty princes, and established their own sovereignty over these conquered territories, which lasted for about 400 years, when it was extinguished by Moslem conquests.—The Nabathæan Arabs, or Ishmaelites, long preserved a distinct name as a nation, asserting their independence alike against the armies of Egypt and Ethiopia, of the Jews, Assyrians, Greeks, and Romans. "It was extremely difficult," says Diodorus Siculus, "either to attack or subdue them, because they retired to their deserts; and if an enemy ventured to follow them, he was sure to perish of thirst and fatigue, for the wells were only known to themselves." In the time of the Assyrian and Babylonian empires these wild tribes remained either wholly independent, or acknowledged a temporary alliance with their monarchs. The Medes and Persians under Cyrus and Cambyses found it necessary to have a friendly understanding with the Nabathæans to secure a safe passage into Egypt. In 312 B. C. Antigonus, one of the successors of Alexander the Great, made an unsuccessful incursion into the territory of the Nabathæans, and in 310 Demetrius, his son, invaded them again. One of the Ptolemies annexed a narrow strip of Arabia to his dominions. In 219 Antiochus the Great captured the city of Rabbath Moab and subdued several tribes. After that the northern Arabs were frequently involved in wars with the new Jewish state, and fortified several cities on its border, as Bostra, Medabah, and Hesbon. Several Roman proconsuls of Syria undertook expeditions against them, but without any further advantage than the payment of a tribute or temporary cessation of hostilities.—In the reign of Augustus, Ælius Gallus, prefect of Egypt, undertook his famous expedition into Yemen at the head of 10,000 Roman legionaries, 500 Jews, and 1,000 Nabathæans; 80 ships of war and 130 transports conveyed these troops down the Red sea under the guidance of Syllias, by whose treachery numbers of the vessels were wrecked. Gallus penetrated as far as Mariaba, represented as the capital of the Rahminites, but effected nothing. Other useless expeditions followed. In A. D. 362 the army of the emperor Julian besieged and destroyed Anbar, the capital of the kings of Hoja.—A new era dawned on Arabia at the birth of Mohammed (about 570). His doctrines soon gained a firm foothold, and Mecca once conquered, he found nearly the whole peninsula at his feet. Abu-Bekr, Omar, Othman, and Ali, who succeeded Mohammed in turn under the title of caliph or emir-el-mumenin, "commander of the faithful," carried forward what he had begun. In the reign of Ali, Moawiyah, governor of Syria, cast off his allegiance, was proclaimed caliph by the western provinces, penetrated into Hedjaz, reduced Medina and Mecca, and extended his conquests as far as Yemen. A few months after Ali's death the sovereignty passed into the hands of Moawiyah, the first prince of the dynasty of the Ommiyades, who held the supreme power over the Moslem empire till A. D. 750. This period is marked by internal dissensions and bloody struggles. Walid I., one of this line, abolished the use of the Greek language and characters, which had hitherto been employed in keeping the accounts, and ordered his clerks and secretaries to substitute the Arabic, a change to which very probably we owe the invention or at least the familiar use of our present numerical figures. To this dynasty, which ruled for nearly 90 years, succeeded that of the Abbassides, who transferred the seat of the caliphate from Cufah to Bagdad, and held sway over a large part of the Mohammedan countries from the 8th to the 13th century. The subsequent history of Arabia is but a succession of quarrels among its numerous petty chiefs, except the reform movement of the Wahabees, a sect founded in the middle of the 18th century by Mohammed ibn Abd-el-Wahab. (See WAHABEES.) In 1870 and 1871 a rebellion broke out among the Bedouins in Hedjaz, which was suppressed by the Turkish troops.—See "History of Arabia," by A. Crichton (Edinburgh, 1834), and "Journey through Central and Eastern Arabia," by W. G. Palgrave (London, 1865).

ARABI AHMED PASHA. (See supplement.)

ARABIC LANGUAGE AND LITERATURE. The Arabic belongs to the southern branch of the Semitic family of languages, and after the Hebrew is the most important member of the family. The other members of the southern branch are the Himyaritic and the Ethiopic. The particular dialect which, mainly through the influence of the Koran, became the standard of the literary language, was that spoken in the central part of Arabia, in Hedjaz and Nedjed. Partly perhaps because of its sheltered position, but partly also because of an unusually strong conservative tendency, the Arabic, though the latest of the Semitic languages to acquire historical importance, is in its forms the most archaic of all. Nowhere else are the inflections so fully preserved, and for the comparative study of these languages the Arabic is of the first importance. In wealth both of grammatical forms and of vocabulary it is equalled by few languages, and no other of the Semitic family approaches it. The characteristic features of the family, the prevailing triliteral and consonantal character of the roots, and the modification of the radical meaning by a significant change of vowels within the root, appear most clearly in the Arabic. There are other features which, if not altogether peculiar to it, are found in the other dialects only in a rudimentary or fragmentary state. Such are the system of case endings and the so-called "broken plurals," that is, collective nouns which have nearly supplanted the proper plurals formed by means of terminations. The number of derived forms of the verb, commonly called conjugations, is also considerably larger in Arabic, each verb having, at least theoretically, 15; and the mode forms are likewise more numerous. As an instrument of thought the Arabic is characterized by great flexibility, delicacy, and precision. While the other Semitic languages have only a very simple syntactical structure, unsuited to the expression of any but the more obvious relations of thought, the Arabic has an extensive philosophical literature. The external history of the Arabic is remarkable, furnishing in many respects a parallel to that of the Latin. It has taken possession of nearly the whole field formerly occupied by the Semitic family. It has also spread over the whole north of Africa, and in central Africa it is still aggressive. The present Arabic-speaking races number about 35,000,000. Where it has not supplanted, it has strongly impregnated the languages with which it has come in contact. The Turkish and Persian have borrowed from it nearly one half of their vocabularies, the Hindostani but little less, the Hindi and Malay quite largely. The languages of western Europe have felt its influence, the Spanish, as was natural, most strongly. Elsewhere it is to be traced mainly in the presence of various scientific and technical terms, such as *algebra*, *alchemy*, *azimuth*, *nadir*, *cipher*, *alcohol*, *elixir*, *magazine*. A glossary of words of Arabic derivation found in Spanish and Portuguese has been published by Dozy and Engelmann (2d ed., Leyden, 1869); in French, by Pihan (Paris, 1851); in Dutch, by Dozy (Leyden, 1867). The literary Arabic has during its whole history remained almost without change, and the various dialects now spoken, when we consider the long period (12 centuries) and the wide territory which they cover, show remarkably little divergence either from the literary language or from each other. They differ from the written language mainly in the frequent loss of final vowels, and with them of inflections of the noun and verb, which they served to distinguish. Phonetic decay has reached about the same stage of progress in the Arabic now spoken that we find in the Biblical Hebrew.—The Arabic alphabet is derived from the Estrangelo, or Old Syriac, and more remotely from the Phœnician, and was introduced not more than a century before Mohammed. It no doubt consisted originally, like the Estrangelo, of 22 characters, which number was afterward raised by the use of diacritical marks to 28. Like all the Semitic alphabets, it is written from right to left, and is essentially consonantal. The vowel signs, written above and below the line, are a later invention, generally attributed to Abul-Aswad, the earliest Arab grammarian, who died in 688. These vowel and diacritical signs were first applied to the Koran, in order to put an end to the disputes to which the previous ambiguous mode of writing had given rise. The Arabic system of vowel notation, unlike the Hebrew and Syriac, is strictly etymological. Only the fundamental vowels *a*, *i*, *u*, long and short, and the diphthongs *au*, *ai*, are written, although in speaking several intermediate vowels are heard. Both in manuscripts and in printed texts the vowel signs are frequently omitted either wholly or in part. There are several forms of the Arabic character, of which the Cufic, so called from the city of Cufah, the seat of one of the early grammatical schools, was the first to gain general currency, though from an early date the *neskhi* or copy-hand was in use, and since the 10th century has been the prevailing form. Of the remaining forms, some, as the Maghrebine or Moorish, have a local currency, and others are employed for special uses. The Arabic alphabet has gained a wide vogue beyond the limits of the language, having been adopted by the Persian, Afghan, Hindostani, Turkish, Malay, and in quite recent times by the Berber and other African dialects. The original defects of the alphabet are seriously aggravated when it is applied to languages of different families.—Grammar was the first of the sciences cultivated by the Arabs, the special motive being the necessity for fixing the text of the Koran; and though it soon reached the limit of its development among them, it always remained a favorite study. The earliest grammatical work which has been preserved is that of Sibawaih, about 780; one of the most celebrated, the subject of numerous commentaries, is the *Alfiya* (so called because composed of 1,000 verses) of Ibn Malek, who died in 1273 (Arabic by Dieterici, Leipsic, 1851; Arabic and French by De Sacy, Paris, 1833). Of those by European scholars, the best are by De Sacy (2d ed., Paris, 1831) and Ewald (Leipsic, 1831–'3). Among grammars devoted to the spoken idioms may be mentioned those of Caussin de Perceval (Paris, 1835), Marcel (on the African dialects generally, 2d ed., Paris, 1869), and Pihan (dialect of Algiers, Paris, 1851). Of the native dictionaries, the chief are the *Sihah* of Al-Jauhari (died about 1007); the *Lisan el-Arab* of Ibn Mukarram (died 1311); the *Kâmûs* of Firuzabadi (died 1414), containing 60,000 words (printed at Calcutta, 1817, and at Cairo, 1864); and the *Taj el-Arûs*, an enormous compilation, of which the *Kâmûs* forms only about a seventh part, made at Cairo in the last century. The materials of the large Arabic-English lexicon of Lane, now in progress (Parts i. to iii., London, 1863–'7), are drawn mainly from the last-mentioned work. Among the other European lexicographers, the chief are Golius (Leyden, 1653) and Freytag (Halle, 1830–'37).—The Arabs have produced a literature of vast extent, and after large reductions from the extravagant estimate sometimes put upon it, a very high value must still be allowed it. It commences with poetry. The oldest remains, in which however the characteristic form and style of Arabic poetry appear already fully developed, go back about a century before Mohammed. With the Koran a new era begins in literary as well as in political history. The Koran was to the orthodox believer not only the rule of faith, but also the highest authority in law, the perfect model in point of style—not simply inspired, but uncreated and eternal. Under the Ommiyade dynasty of Damascus, what there was of literary activity was concentrated mainly on the Koran, the establishing of the text and interpretation, and on the preservation of the traditions of the prophet. The following century, under the Abbasside caliphs of Bagdad, Al-Mansour, Haroun al-Rashid, Al-Mamoun, and Motassem, was the most flourishing period of Arabic literature. Greek philosophy and science were introduced, mainly through the agency of Syrian Christians, and through the medium of translations, made for the most part not directly from the Greek, but from the Syriac. Law, history, and geography were cultivated, schools and libraries established, rewards bestowed on poets and scholars. In this patronage of literature the princes of the Ommiyade dynasty in Spain, especially Hakem II. (961–976), were worthy rivals. After the capture of Bagdad by the Mongols in 1258 the literary spirit gradually declined, and for the last three centuries little has been produced but commentaries on the older literature, and some works of an encyclopædic character. The field in which the Arabs have shown most originality is unquestionably poetry, and its golden age was the century before Mohammed. Of the poems of this period, the most celebrated are the seven *Moallakât*, so called, according to the common but doubtful tradition, because they were "suspended" in the Caaba at Mecca, an honor bestowed on such as carried off the prize in the poetical contests. They have been frequently published, both together (Arabic by Arnold, Leipsic, 1850; English by Sir William Jones) and separately. One of the seven, Amrulkais (German by Rückert, Stuttgart, 1843), holds a first place among all the Arabic poets. Three others deserve to rank with these, Nabiga, Alkana, and Al-Asha; the first two published by Ahlwardt in "Divans of Six Ancient Arabic Poets" (London, 1870). Specimens of many other early poets are found in the *Hamâsa* of Abu Temam (Arabic and Latin by Freytag, Bonn, 1828–'47; German by Rückert, Stuttgart, 1846); in the *Hamâsa* of Bohtori, and in the *Kitâb el-Aghâni* of Ali of Ispahan (Arabic and Latin by Kosegarten, vol. i., Greifswald, 1840). Motanebbi, about the middle of the 10th century (Arabic by Dieterici, Berlin, 1861; German by Von Hammer, Vienna, 1824), is the greatest of the poets after the advent of Mohammed. Arabic poetry is almost exclusively lyrical. Epic and dramatic poetry they have not, and the rhymed treatises on grammar and other prosaic subjects can hardly be classed with didactic poetry. In proverbs Arabic literature is rich, and several collections made by native authors, chief among which is that of Meidani, have been published by Freytag (Arabic and Latin, Bonn, 1838–'43), and a smaller collection by Burckhardt (Arabic and English, London, 1830). The *Makamat* of Hariri (Arabic by De Sacy, 2d ed., Paris, 1847–'53; English by Preston, London, 1850) is a collection of amusing adventures, narrated with much grace and skill in most artfully rhymed prose, interwoven with short poems. It has been admirably imitated, rather than translated, in German by Rückert (Stuttgart, 1837). The romance entitled "Adventures of Antar," of which about a third part has been translated by Hamilton (4 vols. 8vo, London, 1820), is a charmingly drawn picture of Arab life before the rise of Mohammedanism. The famous collection of tales known as the "Thousand and One Nights," or the "Arabian Nights," is of unknown date and authorship. It was first made known in Europe about the end of the 17th century by Antoine Galland, who was employed by Colbert to collect MSS. in the East. The copy of the Arabic MS. brought by Galland from Syria contained a marginal note dated 1584, and from internal evidence the middle of the 15th century has been fixed upon as the probable period of the composition of the work. Some of the tales were evidently borrowed by the writer from older authors, and Von Hammer identifies at least the plot and some of the stories of the "Arabian Nights" with an earlier collection in Persian, called *Hezar Afsaneh* (Arab. *Elf Khurafeh*, "The Thousand Fanciful Stories"). An excellent translation, with elaborate critical and illustrative notes, was made in England by Lane.—Theology and law among the Arabs, as in the East generally, were very closely connected, both resting on the common foundation of the Koran. But the Koran being contradictory on some points, silent on many others, and altogether without order or system, recourse was had first to the oral traditions of the sayings and doings of Mohammed; next to the decisions of the imams or legitimate successors of the prophet, and the early caliphs; and where these failed, to analogical reasoning. Of the commentaries on the Koran, the most esteemed is that of Beidhawi (published by Fleischer, Leipsic, 1844–'8); and of the collections of traditions, that of Bokhari (Krehl, Leyden, 1862–'8). Sharastani gives a view of the many religious and philosophical sects into which Islam was divided (Arabic by Cureton, London, 1842–'6; German by Haarbrücker, Halle, 1850–'51). The great schism is that which divides the Sunnis, the orthodox party, who recognize the authority of the traditions and decisions above mentioned, from the Shiahs, the followers of Ali, who reject many of them. The latter sect prevails chiefly in Persia. There are four leading schools among the Sunnis, all regarded as orthodox, and called after their founders the Hanefite, Malekite, Shafiite, and Hanbalite. They agree in their general principles, but differ in various details, and all date from near the commencement of the Abbasside dynasty. The Hanefite code prevails in India and Turkey; the Malekite in Africa, except Egypt. In Egypt the generally received authority is the Shafiite code, but the courts are Hanefite, the cadi being sent from Constantinople. The fourth or Hanbalite school has little influence. The most celebrated digest of the Hanefite code is the *Hidaya*, translated into English by Hamilton (Calcutta, 1791); another, the *Multaka al-Abkar*, translated into French, is contained in D'Ohsson's *Empire Ottoman* (Paris, 1787–1820). The collections of decisions are also weighty authorities. One of them, the *Futawa Alemjir*, made by order of the emperor Aurungzebe, was printed in Calcutta (6 vols. 4to, 1828–'35), and a portion of it relating to the law of sale has been translated into English by Baillie (London, 1850). The chief authority on the law of inheritance, the *Sirajiya*, was translated by Sir William Jones (Calcutta, 1792). A compendium of the Malekite code by Khalil ibn Ishak has been translated into French by Perron (Paris, 1848–'52); another of the Shafiite code, by Abu Shoja, has been published by Keijzer (Arabic and French, Leyden, 1859.)—Of historical works the number is very large (Hadji Khalfa enumerates 1,300), and the materials for the history of the countries and periods embraced in the Mohammedan dominion are very full and valuable, but outside of this meagre. In style they are for the most part mere chronicles, seldom rising to a comprehensive survey or attempting to trace the deeper historical connections of events. It is a common habit of the writers to quote largely from their authorities, and this makes amends in part for the absence of anything like historical criticism. The following are some of the more important works that have been published, beginning with general histories: Abulfeda, *Historia Muslemica* (Arabic and Latin by Reiske, 6 vols. 4to, Copenhagen, 1789–'94), and *Historia Antemuslemica* (Arabic and Latin by Fleischer, Leipsic, 1831); Masudi, "Historical Encyclopædia" (Arabic and French by Barbier de Meynard, vols. i.–vi., Paris, 1861–'71; English by Sprenger, London, 1841, vol. i. only); Tabari, "Annals" (Arabic and Latin by Kosegarten, Greifswald, 1831–'53); Ibn al-Athiri, "Chronicle" (Tornberg, Upsala and Lund, 1851 *et seq.*); Ibn Koteiba, "Manual of History" (Wüstenfeld, Göttingen, 1850); Ibn Ettiktaka (Ahlwardt, Gotha, 1860); and Hamza of Ispahan (in Arabic and Latin by Rasmussen, Copenhagen, 1817). Histories of the early conquests: Al-Beladori (De Goeje, Leyden, 1863–'7), and Al-Wakidi, "Mohammed's Campaigns" (Calcutta, 1856), "Conquest of Syria" (Lees, Calcutta, 1854), "Conquest of Mesopotamia" (Arabic by Mordtmann, German by Niebuhr, Hamburg, 1847). Histories of particular countries: Al-Makkari, on the history and literature of the Spanish Arabs (Arabic by Dozy and others, Leyden, 1855–'61; English, with omission of the parts relating to literary history, by De Gayangos, London, 1841–'3); Ibn Adhari, Africa and Spain (Dozy, Leyden, 1848–'51); Ibn Abi Zer, *Annales Regum Mauretaniæ* (Arabic and Latin by Tornberg, Upsala, 1843–'6; French by Beaumier, Paris, 1860); Makrizi, "History of the Mameluke Sultans" (French by Quatremère, Paris, 1835–'7), "History of the Copts" (Arabic and German by Wüstenfeld, Göttingen, 1845); Ibn Taghri, annals principally of Egypt (Juynboll and Matthes, Leyden, 1852–'61); a collection of chronicles by various writers relating to the city of Mecca (Wüstenfeld, Leipsic, 1857–'9); a collection relating to Sicily (Amari, *Bibliotheca Arabo-Sicula*, Leipsic, 1855–'7); Al-Suyuti, "History of the Temple at Jerusalem" (English by Reynolds, London, 1836). To the general character of Arabic historical writing above given, we have a noble exception in Ibn Khaldun (died 1406), a writer of a philosophical spirit and a profound historical sense. Of his history, the introduction has been published by Quatremère and translated into French by De Slane (in the *Notices et extraits des manuscrits*, vol. xvi. *et seq.*), and another part, the history of the Berbers, edited and translated by De Slane (Algiers, 1847–'56). Among biographies, that of Mohammed by Ibn Ishak (Arabic by Wüstenfeld, Göttingen, 1858–'60; German by Weil, Stuttgart, 1864) is especially important. —For original speculation in philosophy we must look rather to the religious sects than to the philosophers so called, a name reserved for those who borrowed the systems of the Greeks, especially that of Aristotle, in which they introduced few changes of importance. The most celebrated names among the eastern Arabs are Alkindi of the 9th, Alfarabius of the 10th, and above all Ibn Sina (Avicenna) of the early part of the 11th century. More profound and original was Algazzali (died 1111), who aimed at the overthrow of the existing systems, and from skepticism passed finally to asceticism and mysticism. With respect to the idea of cause, he held substantially the position and anticipated the arguments of Hume. In the 12th century Spain became the centre of philosophical activity, its chief representatives being Ibn Badja (Avempace), Ibn Tophail (Abubacer), and Ibn Roshd (Averroes). The schoolmen first obtained the Latin translations of some of the treatises of Aristotle, not directly from the Greek, but from Arabic versions, and Averroes, as the latest of his commentators, was accepted as his authorized interpreter. In the 13th and 14th centuries the authority of his commentary was hardly questioned, and in the 15th and 16th it was many times reprinted. These circumstances give to Arab philosophy a far higher importance in the history of European culture than its independent value would entitle it to claim.—In mathematics the Arabs were the pupils of Greece and India, but they added not a little to the sum of knowledge which they had received. Neither algebra nor the Arabic numerals were, as the names would seem to indicate, of Arab invention; but the Arabs perfected the processes of the one, arriving at the solution of cubic equations, and they facilitated the introduction of the other. They simplified trigonometrical calculations by substituting the use of sines and tangents for chords. In astronomy they improved the instruments of observation (Abulhassan, "Treatise on Astronomical Instruments," French by Sédillot, Paris, 1834–'5), and constructed new and more accurate tables (Ibn Yunis, Arabic and French by Caussin, Paris, 1804; Olug-Beg, Arabic and French by Sédillot, Paris, 1847–'53). They made some discoveries of importance, among which is perhaps to be reckoned that of the variation of the moon by Abul-Wefa, commonly ascribed to Tycho Brahe, six centuries later.—The science of medicine owes much to the Arabs, especially in the departments of pharmacy and materia medica. In surgery, from ignorance of anatomy, they made little advance. The most celebrated among the medical as well as among the philosophical writers is Avicenna, whose "Canon of Medicine" was for four centuries the leading text book in European schools (printed at Rome, 1593, and in Latin versions not far from 30 times). The *Elhavi* or *Continens* of Al-Razi (Rhazes) enjoyed also a wide reputation, and in the Latin translation passed through many editions. The study of medicine led naturally to that of chemistry and botany. Chemistry made substantial progress among the Arabs. To Geber we owe the first preparation of sulphuric and nitric acids and aqua regia. The distillation of alcohol also, as the name implies, was a discovery of the Arabs. Botany was little more than the handmaid of medicine. There was no attempt at scientific classification, but only an alphabetic arrangement of the material, as among the Greek botanical writers. But in the number of plants described, the style of description, and the determination of synonymes, the advantage is largely on the side of the Arabs. The best known writers are Al-Nabati and Ibn Baitar (German by Sontheimer, Stuttgart, 1840–'42). —In geography the Arabs have rendered most important services, less in the mathematical than in the descriptive branch of the science. The vast extent of the empire of the caliphs, and the reports gathered from the governors of remote provinces, the commercial intercourse reaching even beyond the limits of the empire (witness the Arabic coins frequently dug up in northern Russia and even in Norway, which prove the existence of an established trade, if they do not necessarily suppose the presence of Arab merchants), the pilgrimage to Mecca, which it was the duty of every Moslem who had the ability to make once at least in the course of his life—all this could not but add materially to the sum of geographical knowledge. The narrative of an Arab merchant named Soleyman, who visited China in the 9th century, was published in Arabic and French by Reinaud (*Relation des voyages dans l'Inde et à la Chine*, Paris, 1845). Al-Istakhri and Ibn Haukal about 950 traversed the different Mohammedan provinces from the Atlantic to India. The *Liber Climatum* of the former was published by Möller (Gotha, 1839; German by Mordtmann, Hamburg, 1845).

The "Oriental Geography of Ibn Haukal," by Ouseley (London, 1800), is translated from a Persian version in which the works of Al-Istakhri and Ibn Haukal have been recast and combined in one. Especially important are the geography of Edrisi (about 1150), who lived at the court of Roger II. of Sicily, and who visited England (French by Jaubert, Paris, 1836-'40; and the portion relating to Africa and Spain, Arabic and French, by Dozy and De Goeje, Leyden, 1866); the "Geographical Dictionary" of Yakut (died 1229), published by Wüstenfeld (Leipsic, 1866 *et seq.*); geography of Abulfeda (Arabic by Reinaud and De Slane, Paris, 1840; French by Reinaud, Paris, 1848). Ibn Batuta (died about 1377) surpassed all in the extent of his travels, which reached from Spain to China and into central Africa (Arabic and French by Defrémery and Sanguinetti, Paris, 1853-'9; English, abridged, by Lee, London, 1829). Abdallatif, a physician, wrote an account of Egypt, founded on his own observations, and of great value (De Sacy, Paris, 1810). He took advantage of a plague in Cairo in 1201-'2, of which he gives a graphic description, to make anatomical investigations. The Arab geographers, instead of following in their descriptions political or physical divisions of the globe, generally adopted, after the example of the Greeks, the system of climates or zones, usually seven. In the determination of latitudes and longitudes, of the magnitude of the earth, and the shape of the continents, they made a somewhat nearer approach to the truth than the Greek geographers. Under the caliph Al-Mamoun (813-'33), a measurement was made of the length of a degree of latitude.—Such is the extent of Arabic literature that, notwithstanding the labors of European scholars and the production of native presses, especially at Boulak, Cairo, and in India, and recently in England, where Rigk Allah Hassoun, an Arabic poet, has devoted himself to the production of standard works, the greater part even of what has been preserved is in manuscript, and still more has perished. In proof of the great number of works lost, we need not appeal to the exaggerated accounts of the libraries of some of the Mohammedan princes (Hakem II. of Spain is said to have collected 600,000 volumes). Works in literary history, always a favorite department with the Arabs, furnish abundant evidence. The most important of these works are the *Fihrist* or "Catalogue of Sciences" of Ibn al-Nadim, of the 9th century (published by Flügel, vol. i., Leipsic, 1871); the "Biographical Dictionary" of Ibn Khallikan, of the 13th century (Arabic by Wüstenfeld, Göttingen, 1835-'50; French by De Slane, Paris, 1842-'71); and Hadji Khalfa's (died 1635) "Dictionary of Arabic, Persian, and Turkish Literature" (Arabic and Latin by Flügel, 7 vols. 4to, Leipsic, 1835-'58). Hammer-Purgstall's "Literary History of the Arabs (7 vols. 4to, Vienna, 1850-'56), which comes down only to the year 1258, contains notices of about 10,000 writers. Of the printed books a tolerably complete index is contained in Zenker's *Bibliotheca Orientalis* (Leipsic, 1846-'60).

ARABICI, or **Arabians,** a Christian sect of the 3d century, founded by Beryllus, bishop of Bostra in Arabia. They denied the divinity of Christ, and affirmed that the soul dies with the body, and is raised to life again with it in the resurrection. Origen contended with Beryllus, and a synod condemned the Arabici.

ARACAN, or **Arracan.** **I.** A division of British Burmah, including the districts of Akyab, Sandoway, and Ramree, bounded W. by the bay of Bengal, S. by Pegu, and separated by the Youmadoung mountains on the E. from Ava; area, 23,529 sq. m.; pop. in 1871, 447,957. It is a hilly region, with numerous fertile plains and valleys, dense jungles, and pestiferous marshes. The coast has very few harbors, and though the country is rich in timber, coal, petroleum, salt, tobacco, and rice, and has considerable trade, there are few important towns. The climate is very unhealthy to Europeans. The principal river is the Aracan or Kuladyne, which enters the bay of Bengal 15 m. N. of Akyab, after a S. course of about 200 m. The aboriginal inhabitants, called Mughs, constitute about half the population. Education is very general, few being unable to read and write. The province was conquered by the Burmese in 1783, and taken from them by the British in 1824. Capital, Akyab. **II.** A town, the former capital of the above province, on the river Aracan, about 50 m. from its mouth; pop. about 10,000. It is a straggling, decaying place, which once had about 95,000 inhabitants. The climate is extremely unwholesome.

ARACATI. **I.** A port of Brazil, in the province of Ceara, on the Rio Jaguaribe, about 10 m. from the sea, lat. 4° 31′ S., lon. 37° 48′ W.; pop. about 20,000. It has five churches, and a very fine town hall. Its exports are mainly cotton and hides. At the mouth of the river is a dangerous bar. Severe floods occur during the rainy seasons. **II.** A river in the same province, flows due N. about 120 m., and enters the Atlantic by two mouths, near Pernambuquinho, 150 m. N. W. of the town of Aracati.

ARACHNE, in Greek mythology, a Lydian maiden, famous for her skill in weaving. She challenged Minerva, and wove a piece of cloth on which the amours of the gods were represented. This work was so faultless that Minerva, despairing of being able to excel it, tore it to shreds, whereupon Arachne hung herself. The goddess loosened the rope and saved the life of Arachne; but the rope was transformed into a cobweb, and the maiden into a spider (Gr. ἀράχνη), that insect which Minerva most hated.

ARACHNIDA, a class of invertebrate animals belonging to the articulata, and including spiders, mites, and scorpions. The arachnida differ from insects in having no antennæ; in the number of eyes being in most species 8, and, even when only 2, in never being placed laterally on the head; in the legs being usually 8, although in some species 6, and in others 10; and in their respiratory apparatus consisting of radiated tracheæ. Most arachnida are carnivorous. Some parasitic species, such as the minute parasite mites, are furnished with a sucker, in some respects constructed like that of the gadfly. In other species there is a pair of upper jaws and a pair of under jaws carrying jointed feelers, and between them a sort of tongue formed by a projection from the breast. At the back of the mouth there is a piece of horny texture, termed by Savigny, Latreille, and Audouin the pharynx, forming the entrance into the gullet. The gullet, the stomach, and the intestines run in a direct line from the pharynx to the vent. In most arachnida there is a complete circulatory system of arteries and receiving veins, returning blood. The respiratory organs have two peculiarities, on which Latreille established his two great divisions of arachnida, *pulmonaria* and *trachearia*. The *pulmonaria*, which Straus-Dürckheim and Léon Dufour place in the first or chief division, comprises the numerous species of spiders and the scorpions. Their respiratory apparatus consists of small cavities formed by the union of triangular laminæ of extreme thinness. The division furnished with air pipes (*trachearia*) similar to those of insects, comprises the harvest or shepherd spiders, mites, and other genera. "The presence of tracheæ, or air pipes," says Latreille, "excludes all complete circulation; that is, the distribution of blood to different parts, and its return from the respiratory organs to the heart." The eyes of the arachnida are all simple. In most species of spiders they are 8 in number, but in some they are 6 and in others only 2. Nothing is known of the organs of hearing in arachnida, although it has been well ascertained that these animals do hear. Male spiders are always much smaller than the females. The *palpi* or feelers of the male are furnished with organs of various forms, usually bulging at the tip; the feelers of the female gradually taper to a point. The eggs of spiders, not having a hard shell, are soft and compressible. Before being laid, they lie in the egg bag, squeezed together and flattened, within the spider's body, but assume the globular form after being laid. The female spider, in preparing a nest for her eggs, uses her own body as a bird uses its body to give form and proper size to its nest. The eggs are excluded from a cavity just behind the breast. The hatching of the eggs of one species (the *epeira diadema*) has been traced with care, and the successive evolution of the embryo depicted with skill, by Moritz Herold of Marburg.—Latreille arranges the arachnida into two great orders, *pulmonaria* and *trachearia*. He subdivides the first order, *A. pulmonaria*, into two families, under the names of *araneidæ* and *pedipalpi*. The *araneidæ* include our common spiders, having palpi simple, pediform; mandibles armed with a movable and perforated claw, emitting a poisonous liquid; abdomen inarticulate, terminating by spinnerets. The *pedipalpi*, including the scorpions and their allies, have the abdomen articulate, without spinnerets; palpi produced, cheliform (*chela*, claw), or shaped like pincers; mandibles with a movable digit. The second order, *trachearia*, includes various forms of shepherd spiders and sea spiders, mites, and ticks; true mites, garden mites, spider mites, wood mites; true ticks, plant ticks, water ticks, harvest ticks; false scorpions, book scorpions; shepherd spiders, sea spiders, and parasitic sea spiders.

ARAD, a town of Hungary, capital of the county of the same name, on the right bank of the Maros, 19 m. N. of Temesvár; pop. in 1869, 32,725. It is the seat of a Greek bishop, and contains a gymnasium and Wallachian college. Considerable trade is carried on with Germany and the Black sea, chiefly in tobacco and cattle. Its annual fair is second only in importance to those of Pesth and Debreczin. In the 17th century the city was captured and destroyed by the Turks. It is skirted on two sides by the Maros, and defended by a fortress, which, held by the Austrians, capitulated only after a long siege to the Hungarian army in the revolutionary war of 1849. Three months later (Oct. 6), Arad witnessed the execution by the Austrian authorities of 13 Hungarian generals and colonels, who had surrendered with Görgey at Világos (Aug. 13), or, following his example, a few days later.—On the opposite bank, and connected by a bridge, is New Arad (Hun. *Új Arad*), in the county of Temes; pop. 4,960.

ARADUS (now *Ruad*), a rocky islet, about a mile in circumference, lying 2 m. off the Syrian coast, in lat. 35° N., 35 m. N. of Tripoli. It was early occupied as a stronghold by the Phœnicians, known to the Hebrews as Arvad, a city second only to Tyre and Sidon, and held supremacy over a considerable tract on the adjacent mainland, where Antaradus was founded. The city shared in the general fortunes of Phœnicia, and about A. D. 638 was destroyed by Moawiyah, the lieutenant of the caliph Omar, and never rebuilt. Aradus is the only island on the Syrian coast mentioned by the historians of the crusades. It is now occupied by about 3,000 people, mainly fishermen. Remains of the old Phœnician walls are still to be seen.

ARAFAT, or **Orphat** (Arabic, gratitude), a granitic hill in Arabia, near Mecca, a pilgrimage to which is enjoined upon all who visit that city. It rises about 200 feet above the plain. The pilgrimage occupies three days from Mecca. On the second day the ceremony of the sermon on the mount is observed. The cadi of Mecca usually preaches the sermon, riding first upon a camel up the entire length of the stone steps which ascend the mountain to the summit. Hearing this sermon is the great point of the pilgrimage, and confers the title of *hadji* (pilgrim). There is a tradition among the Mohammedans that on this mountain Adam first met Eve again, after a separation of 120 years immediately following the expulsion from paradise. On the summit is a chapel, which, according to tradition, was built by Adam himself.

ARAGO. I. Dominique François, a French physicist and statesman, born at Estagel, near Perpignan, Feb. 26, 1786, died in Paris, Oct. 2, 1853. After studying mathematics at the college of Perpignan, he entered in 1808 the polytechnic school. On leaving it in 1805, he was appointed secretary of the board of longitude, and in 1806 he was commissioned to finish in conjunction with Biot the measurement of an arc of the meridian in Spain, begun by Delambre and Méchain, as the basis of the decimal metrical system of France. He was employed in the island of Majorca on the outbreak of war, taken for a spy, saved from the mob by some months' confinement in a fortress, afterward taken by Spanish corsairs from an Algerine vessel and harshly treated, enlarged on the demand of the dey, shipwrecked on the coast of Sardinia, and after new perils reached Algiers in a Bedouin disguise. Here he was treated with suspicion by a new dey, but finally reached Marseilles in a French frigate in 1809. On his arrival in Paris he was elected a member of the institute, though only 23 years old, and soon afterward appointed professor at the polytechnic school. In 1830 he became perpetual secretary of the academy of sciences, and director of the observatory, a post which he retained till his death. He rendered special services to optics by his own experiments, and by his influence over others, and especially by directing the labors of Fresnel and Malus. He was the first to recognize the value of Young's optical papers. He investigated magnetical phenomena, and made some contributions to meteorology, especially in connection with electricity. He also successfully investigated the colors of polarized light, the application of polarization as a test of the origin of light, the experimental proof of the retardation of light in dense mediums, the apparent magnetism of copper rotating near a permanent magnet, and the influence of the aurora upon the needle. For the last three years of his life he was blind and otherwise a sufferer. He was the author of more than 60 distinct memoirs on various branches of science. He established, in concert with M. Gay-Lussac, in 1816, the *Annales de chimie et de physique*. The article in the "Edinburgh Encyclopædia" on the polarization of light is from the pen of Arago. His complete works appeared in Paris in 17 vols. (1855–'60), under the direction of Barral. From the royal society of London he received in 1829 the Copley medal, an honor never before conferred upon a French man of science. When Napoleon, after the battle of Waterloo, thought of emigrating to the United States, for the purpose of devoting the remainder of his life to scientific pursuits, he invited Arago to accompany him; and when this intention was foiled by the English, Monge endeavored in vain to prevail upon Arago to follow the ex-emperor to St. Helena. On the outbreak of the revolution of 1830, Arago espoused the cause of the people. In 1831 he was elected member of the chamber of deputies by his native department of Pyrénées-Orientales, and took his seat on the extreme left. He delivered memorable speeches in behalf of science and education, and in the political questions of the day he strenuously opposed all encroachments upon the rights of the people, and denounced the government monopoly of railways and the project of the fortifications of Paris. He was also a member of the council general of the Seine, of which he was president till 1849, and the declaration of the council in favor of the emancipation of slaves was due to him. He took a conspicuous part in the movement which led to the overthrow of Louis Philippe, and on Feb. 24, 1848, he became a member of the provisional government, and officiated first as minister of marine, and afterward added to the functions of this office the duties of the war department. He belonged to the republican wing of Marrast and Marie, who opposed the theories of the socialists, and advocated liberal institutions, as they exist in the United States. At the same time he represented his native department in the constituent assembly. When the provisional government surrendered the reins of power, the assembly appointed him member of the executive commission. In this position he displayed great personal courage during the bloody days of June, 1848. He opposed the election of Louis Napoleon to the presidency, and gradually ceased to take part in public affairs. But to the last he proved true to his republican creed, and after the *coup d'état* of December, 1851, refused to take the oath to the government of Louis Napoleon. **II. Jean,** brother of the preceding, born in 1788, died in Mexico, July 9, 1836. He was a subtreasurer in Perpignan, and, having been deprived of his appointment on a denunciation which subsequently turned out to be false, he embarked for New Orleans, and, joining the younger Mina, became a general in the Mexican service in the war of independence. **III. Jacques Étienne Victor,** brother of the preceding, born at Estagel, March 10, 1790, died in Brazil in January, 1855. When only 20 years of age he made an artist's tour through various countries of the Mediterranean. In 1817 he sailed in the exploring vessel Uranie as draughtsman to the expedition. The ship was wrecked at the Moluccas, and Arago did not return to France till 1821. He afterward resided at Bordeaux and Toulouse, and lost his sight in 1887, which, however, did not prevent him from engaging in new voyages. His most interesting work is *Souvenirs d'un aveugle: Voyage autour du monde* (with illustrations and comments by François Arago, 2 vols., Paris, 1838 *et seq.*). **IV. Étienne,** brother of the preceding, born at Perpignan, Feb. 7,

1803. He studied at Lorèze, and undertook a course of chemistry at the polytechnic school, which he quitted for the purpose of joining the secret societies. He established the *Lorgnette* and *Figaro* newspapers, and was director of the Vaudeville until it was burned down. He has written upward of 100 theatrical pieces, including *Les aristocraties*, a five-act comedy, produced at the Théâtre-Français. In 1830 he closed his theatre to join in the popular movement, and distributed the theatrical stock of arms to the people during the three days of July. He was among the most prominent to signalize his disapproval of the shortcomings of Louis Philippe's government, which cancelled his theatrical license in 1840. The *Réforme*, a daily democratic journal, was founded by Étienne Arago. He was one of the prime movers in the revolution of 1848, and placed himself in the direction of the post office, which post he held till the retirement of Gen. Cavaignac. In 1849 he was expelled from France for his participation in revolutionary movements, and went to Belgium, which country he was also obliged to leave in 1851 at the request of Louis Napoleon; and after wandering about in different countries, he settled at Turin. The amnesty of 1859 enabled him to return to Paris. He attracted much public attention in 1862 by leaving the *société des gens de lettres* upon the ground of its being controlled by the banker Mirès and other schemers. In 1870 he was mayor of Paris from Sept. 5 to Oct. 31, when the invasion of the hôtel de ville forced him to retire. Among his later productions are a poem on Spa, the Belgian watering place (Brussels, 1851); a historical novel relating to the Vendean wars, *Les Blancs et les Bleus* (2 vols., Paris, 1862); and a vindication of his course in the February revolution, *Les postes en* 1848 (1867). **V. Emmanuel**, an advocate and politician, son of Dominique François, born in Paris, Aug. 6, 1812. His name as well as his opinions and tendencies caused him to be retained in several political cases of importance. In 1839 he defended Barbès and Martin Bernard. He took an active part in the revolution of 1848. When the abdication of Louis Philippe was announced in the chamber, Arago, who had penetrated thither, rose and loudly proclaimed that royalty was by this act extinct, and that the people objected to a regency. Lamartine and other deputies followed, and a provisional government was organized on the spot. Lyons being in a turbulent state on account of destitution among the working class, Arago went there as commissary general, with plenary powers, and ordered 500,000 francs to be immediately applied in relief of the distress. This action was subsequently made the subject of furious party invective. He became a member of the legislative assembly for the Pyrénées-Orientales, and was envoy in Berlin from May till December, when on Louis Napoleon's election to the presidency he resigned, and strenuously opposed him after his return to Paris in the constituent and subsequently in the legislative assembly. After the establishment of the second empire, he devoted himself almost exclusively to the law, acquiring distinction by defending in 1867 the Pole Berezowski, who attempted to murder the czar at the time of the Paris exposition, and in 1868, together with Gambetta and Crémieux, the journalist Peyrat, who had started the project of a monument in honor of Baudin. In 1869 he was put forward for the legislative assembly in two departments, but defeated by the government candidates. In 1870 he became a member of the provisional government without portfolio, resisting the aggressions of the rioters on Oct. 31. At the age of 20 Emmanuel Arago published a volume of poems, and was for five years afterward engaged in theatrical writing.

ARAGON, formerly a kingdom, now a royal captaincy general in the northeast of Spain, bounded N. by the Pyrenees, separating it from France, E. by Catalonia, S. E. by Valencia, S. W. by New Castile, and W. by Old Castile and Navarre; area, 17,984 sq. m.; pop. in 1867 (estimated), 925,773. The surface is irregular from the numerous spurs of the Pyrenees that cross it, besides which it is separated from the neighboring provinces by ranges of lofty hills, that convert it almost into a basin. The Pyrenean chain in Aragon reaches a great altitude, some peaks exceeding 11,000 feet. The province is watered by the Ebro and its tributaries, the Huecha, Jalon, Jiloca, Huerva, Aguas, Martin, Guadalupe, and Nonaspe, on the right, the Gallego, Isuela, and Cinca on the left. A canal commenced in 1528 by Charles V. stopped short of its object, which was to reach the sea at Tortosa, and furnish a maritime outlet for the province. It extends from Tudela, in Navarre, to Sastago. Its average width is 69 feet, its depth 9 feet. It is mostly lined by high, thick walls, and crosses the Jalon river by an aqueduct 4,800 feet in length. The chief productions of Aragon are grain, flax, and hemp of good quality, fruits of various kind, maize, wine, and various dyestuffs. The mineral productions are iron, quicksilver, lead, copper, cobalt, marble, and coal. The mines and quarries are indifferently worked, the chief being one of rock salt near Remolinos. Cattle are not very plentiful, but sheep and swine are bred in considerable numbers. The mountains and forests abound in game. Aragon is divided into three provinces, Huesca, Saragossa, and Teruel. The principal city is Saragossa.—After the fall of the Roman empire Aragon passed into the hands of the Visigoths. Early in the 8th century it was conquered by the Moors, from whom it was eventually taken by the rulers of Navarre. In 1035 Ramiro I., son of Sancho III. of Navarre, received it in partition and raised it from a county to a kingdom. The four succeeding kings of the same house enlarged the kingdom, which, after the acquisition of the county of Barcelona, passed from the Navarre to the Barcelona dynasty about the middle of the 12th century. The latter gave 11 kings to Aragon, ending with Martin in 1410, and won and kept the Balearic islands, Sicily, and Sardinia. The Barcelona dynasty was succeeded in 1412 by Ferdinand I. as the first king of the house of Castile. In consequence of the marriage of Ferdinand II. with Isabella, heiress of Castile, in 1469, Aragon and Castile were united, and the consolidation of the Spanish monarchy dates from the accession of their grandson Charles V. (1516).—The Aragonese had probably the earliest representative system of Europe. Their *fueros* (constitutional charter) compelled the king to take an oath to support them, to give to his subjects half the territory he should take from the enemy, not to enact laws without their consent, nor to declare war or to make peace without the consent of his counsellors. The *fueros* provided a cortes, in which all classes of the state were represented, and also enunciated principles of self-government and popular rights not exceeded by the liberalism of the present day. To insure the sovereign's adherence to this compact, a *justicia* was provided for as guardian of the laws. He was to be appointed by king and cortes together; his decisions were without appeal, and he was only answerable to the nation at large. The cortes were composed of the nobility, the caballeros, and the commons, to whom in 1301 the ecclesiastics were added. Unanimous consent of the king and the four orders was requisite to a law. The cortes were summoned and dismissed by the king, who presided at their deliberations in person, unless unable to do so, in which case the crown prince or his lieutenant was present. He could not remain in the cortes at the taking of the votes on a measure. Every Aragonese had the right to lay before the cortes any *greuges* (grudges or grievances) in relation to a breach of the *fueros* of the kingdom, and the cortes appointed a committee to report on the grievance. After all petitions and grievances had been disposed of, but not before, the cortes voted the supplies for the services of the state. These supplies were of a limited character. In 1376 the first money grant was asked by Pedro IV. to levy a body of men-at-arms. The Aragonese cortes refused, being "accustomed," as they said, "to serve the king with their persons, not their purses." Subsequently, the same king, however, coaxed his subjects into a loan. In 1412 Ferdinand I. obtained another loan, which loans paved the way to royal aids, benevolences, and other exactions. On the dissolution of the cortes, officers called a *disputacion*, and associated with the *justicia*, were appointed by the cortes to watch over the public interests until they met again. The Aragonese had an ancient constitutional right of taking up arms as a defence against the refusal of their king to observe and protect their *fueros*. The king at his coronation having taken the oath to uphold the constitution, protect the *fueros*, and do justice, the *justicia* who administered it replied in the name of the people, "We, who are worth as much as you, take you for our king and lord, provided you keep our laws and liberties; otherwise not." The decline of Aragonese liberty began with the union of the crowns of Aragon and Castile, which increased the power of the monarchy; and the accession of Charles V. was the death blow to the liberty and privileges of the Spanish cities and provinces. In the reign of Philip II. the *justicia*, Juan de Samoza, having summoned the people to arms to protect their *fueros*, the king sent a force against him, and wrote an autograph letter to his general, directing him to take and punish the *justicia* without delay; an order which was strictly obeyed, the judge being beheaded without form of trial.

ARAGONA, a town of Sicily, in the province and 8 m. N. by E. of Girgenti; pop. about 8,000. It is a very poor place, situated on a bare plain, backed by steep hills; but it has a large castle of the princes of Aragona, and is in the neighborhood of extensive sulphur mines, and of the mud volcanoes called Maccalube, which rise about 200 feet above the plain, and are known to have been in a state of continual activity for 1,500 years.

ARAGUAY, or **Araguaya**, a river of Brazil, rises in lat. 18° 10′ S. and lon. 51° 30′ W., flows northward, between the provinces of Matto Grosso and Goyaz, to São João, lat. 6° 5′ S., where it unites with the Tocantins, and the combined stream discharges its waters, after a course of nearly 400 m. further, into the southern estuary of the Amazon, in lat. 1° 40′ S. Its whole course is about 1,300 m., of which about 1,100 are navigable. About midway in its course it separates into two arms, which enclose the island of Banana or Santa Anna, 210 m. long and 40 broad. Its principal tributary is Das Mortes, which joins it in lat. 12° S. Many tribes of warlike savages are found on the banks of the Araguay. It furnishes an uninterrupted navigation from Pará almost to the head waters of the Paraná.

ARAKTCHEYEFF, Alexei, count, a Russian statesman, born in 1769, died May 3, 1834. He was of an obscure family, was educated in the military school of St. Petersburg, entered the artillery, and reached in it the highest rank. He was a favorite of Paul I., and for a short time governor general of St. Petersburg, but was dismissed on account of his insufferable harshness. Paul made him commander of his favorite regiment of guards at Gatchina, an imperial residence in the environs of the capital. Suspicious of danger, Paul the day before his murder sent an order for Araktcheyeff and his regiment. The courier was detained by the conspirators, and Araktcheyeff reached the barriers of the capital too late. Alexander, the successor of Paul, kept Araktcheyeff near his person, and he remained unshaken in his master's favor. He was energetic and active, but hard and utterly distrustful. The military colonies introduced into Russia under Alexander, were created and organized by Araktcheyeff amid bloodshed and cruelties. During the last years of the czar's reign Araktcheyeff became virtual ruler of the empire, issuing laws and ukases on blanks with the imperial signature. Soon after Alexander's death he was ordered to confine his residence to his estates at Gruzino. He left the bulk of his large fortune to a military school founded by him in Gruzino, and $20,000 to serve, with the accumulated interest, as a prize for the best history of the reign of Alexander, 100 years after his death. It is supposed that this part of the will was annulled by Nicholas.

ARAL, Sea of, a large inland sea or lake of Asiatic Russia and Turkistan, between lat. 42° 30′ and 47° N., and lon. 57° 30′ and 61° 30′ E. It lies about 40 feet above the ocean, and more than 100 feet above the Caspian sea, from which it is 200 m. distant at the nearest point, and with which Humboldt and others suppose it to have been formerly connected. The Aral, covering an area of about 24,000 sq. m., is, next to the Caspian, the largest inland sea of the eastern hemisphere. It is shallow, with many islands. It has no outlet, but the Sir Darya or Sihoon (the Jaxartes of the ancients), the Amu Darya or Jihoon (the Oxus), and several smaller rivers flow into it. The water is brackish, but is freely drunk by horses, and is used for culinary purposes. Fish are abundant. The navigation of the sea of Aral is exceedingly difficult for sailing vessels; perfect calms alternate with violent and sudden storms, oftenest coming from the northeast. The harbors and anchorages are few and insecure. The shores are generally low and sandy, but on the northern side are small hills of clay. Its borders are generally uninhabited in summer, but in winter they are frequented by nomadic tribes from the Kirghiz steppes. The sea of Aral is in the power of the Russian empire. The Russians explored and made a map of it as early as 1740, and they sent occasional expeditions to its borders till 1847, when they built a fort at the mouth of the Sir, and began to take military possession of the principal islands of the lake. Colonies were soon afterward founded, and Russian vessels began the regular navigation which they have since continued.

ARAM (Latinized *Aramæa*), the Hebrew name of the region lying N. and E. of Palestine and Phœnicia, and extending to the Tigris, the northern and southern boundaries never having been accurately defined. It corresponded generally to Syria and Mesopotamia of the Greeks and Romans, and included parts of Chaldea and Assyria. In the Septuagint the name is usually rendered by Syria. It means highlands, for, although most of the region is a low plain, the part which immediately borders upon Palestine is elevated. That portion between the Tigris and Euphrates is specially designated as Aram-naharaim, "Aram of the two rivers," answering to the Greek Μεσοποταμία. Here was the original home of Abraham, whence he migrated to Canaan. From this migration dates the long separation between the Hebrews and their Aramæan kindred.—The Aramaic language remained in a rude state after the separation, while the Hebrew, which was undoubtedly at first identical with it, became greatly developed; so that in the time of Hezekiah the former was unintelligible to the mass of the Jews. When the ten tribes of Israel were carried away, their place was partly supplied by various Aramæan immigrants, who gradually formed a patois designated as Galilean or Samaritan. The exiles from Judah, during their residence in Babylonia, abandoned their own language and adopted the Aramaic, which they brought back with them to Judea. This formed the current language in Palestine until it was partially superseded, after the Macedonian conquest, by the Greek. Christ and his principal disciples probably spoke both languages; they certainly spoke Aramaic. In the 7th century the Moslem invasion of Syria introduced the Arabic language, which gradually took the place of the Aramaic; and the latter has become nearly extinct, existing now as a living tongue only among the Syrian Christians near Mosul. Properly speaking, the Aramaic has no literature of its own. As a written language it has been used in its two branches, the Chaldee and Syriac, only by the Hebrews and eastern Christians, and by them only in treating of religious subjects. The canonical books of the Old Testament contain two extended passages in Chaldee (Ezra vii. 12–26; Dan. ii. 4 to vii. 28). Several of the apocryphal books were written in Aramaic, although they now exist only in the Greek translation. The versions of Hebrew Scriptures known as Targums are written in Aramaic. It is not unlikely that the Gospel of Matthew was originally written in it, although we have it authentically only in its Greek form. The Talmud, as a whole, is written in Aramaic, but with such variations from the main dialects that some have proposed to give the name Talmudic to the idiom in which it is composed. (See Chaldee Language and Literature, and Syriac Language.)

ARAM, Eugene, an English scholar, born at Ramsgill, Yorkshire, in 1704, executed at York for murder, Aug. 6, 1759. Aram enjoyed a remarkable reputation for extensive scholarship acquired under the greatest difficulties, his father having been a poor gardener. After his marriage he established himself as a schoolmaster in his native district of Netherdale. In 1734 he removed his school to Knaresborough, where in 1745 he became implicated in a robbery committed by Daniel Clark, a shoemaker of Knaresborough; and being discharged for want of evidence, he went to London. Clark disappeared mysteriously at the same time. Aram, while employed as school usher in various towns, and in an academy at Lynn in Norfolk, pursued his favorite studies, and was engaged in compiling a comparative lexicon of the English, Latin, Greek, Hebrew, and Celtic languages, when he was arrested on the charge of murder. Aram's wife had frequently intimated that he and a man named Houseman were privy to the mystery of Clark's disappearance. Houseman, on being pressed by the coroner, testified that Aram and a man named Ferry were the murderers, and that the body had been buried in a particular part of St. Robert's cave, a well known spot near Knaresborough. A skeleton was discovered in the exact place indicated, and Houseman's evidence led to Aram's conviction. Aram refused the services of counsel, and conducted his own defence in an elaborate and scholarly manner, making an ingenious plea of the general fallibility of circumstantial evidence, especially that connected with the discovery of human bones. After condemnation he acknowledged his guilt. On the night before the execution he attempted suicide, but was discovered before he had bled to death, and his sentence was carried into effect three days after it was pronounced. Before he attempted suicide he wrote an essay on the subject, and also a sketch of his life. Of his "Comparative Lexicon" only passages from the preface are extant. He left a widow and six children. A veil of poetry has been thrown over his fate by Thomas Hood's ballad of "The Dream of Eugene Aram," and Bulwer's romance of "Eugene Aram."

ARANDA, Pedro Pablo Abarca y Bolea, count of, a Spanish statesman, born in Saragossa in December, 1718, died in 1799. He first served in the army, but subsequently devoted himself to the civil service. After officiating for seven years as ambassador of Charles III. at the court of Poland, he was appointed commander of the army in Portugal. Here he captured Almeida in August, 1762, and was afterward appointed captain general of Valencia. In 1765, after quelling an insurrection in Madrid, he was made president of the council of Castile, and soon after prime minister. He inaugurated a new municipal system, established schools, provided Madrid with a permanent garrison, strengthened the army and navy, advanced the industrial and agricultural interests of the kingdom, and reformed the financial condition of the bank of San Carlos. He established a law which made the sanction of the council of Castile requisite for the validity of the decrees of the Vatican, opposed the inquisition, and set up a political censorship in order to neutralize its influence. By a decree of April 2, 1767, the Jesuits were expelled from Spain, and their property confiscated. The hostility of the clerical party, heightened by his confidential correspondence with Voltaire, who had urged him to persevere in his work of reform, forced him in 1773 to tender his resignation as prime minister. Accepting the post of ambassador at Paris, he became noted for his opposition to England, which had indeed always been the leading feature of his foreign policy. He prevailed upon Charles III. to join France in supporting the cause of America, and in 1783 was one of the signers of the treaty of Paris, which recognized the independence of the United States. In 1787 he returned to Spain, and in 1792 again became prime minister as successor of Florida Blanca; but under Charles IV. he was forced to surrender the place to the queen's favorite, Godoy. On occasion of the war with France, he expressed himself against its justice, and this remark was seized upon as a pretext to banish him from the capital.

ARANJUEZ (anc. *Ara Jovis*), a town of Spain, in the province and 30 m. by railway S. of the city of Madrid, on the left bank of the Tagus; pop. 3,800. It is the site of a royal palace of great beauty founded by Philip II., a favorite retreat of the monarchs of Spain during the spring, and is well supplied with gardens, cafés, hotels, and various places of fashionable amusement. The presence of the court swells the population to about 20,000. In summer the place is not healthy.

ARANY, János, a Hungarian poet, born at Nagy-Szalonta, in the county of Bihar, in 1817. He is the son of a poor Protestant, who educated him for the church. After leaving college he roamed for a while with a troop of strolling players, and then returned to Szalonta and supported himself as a teacher of Latin. In 1843, the Kisfaludy society having offered a prize for the best popular epic, Arany won it by his poem, *Az elveszett alkotmány* ("The Lost Constitution"). In 1847 he sent to the same society the first part of his greatest production, the trilogy *Toldi*. The society gave the author more than the stipulated price, and had it printed at their expense. In February, 1848, appeared his *Murány ostroma* ("Siege of Murány"). Since 1848 his chief literary works have been *Katalin* (1850), the second part of *Toldi* (1854), two volumes of lyric poems (1857), and another trilogy, *Buda halála*, the first part of which appeared in 1864.

ARAPAHOE, an E. county of Colorado territory; area, 4,600 sq. m.; pop. in 1870, 6,829. The Kansas Pacific railroad passes through the county and terminates at Denver, and is connected by a branch from that city with the Union Pacific at Cheyenne. Capital, Denver, which is also the capital of the territory.

ARAPAHOES, an Indian tribe which has for many years resided near the head waters of the Arkansas and Platte rivers. They are known also as Fall Indians, and were called by the French the Gros Ventres of the south. Gallatin supposed them to be the Querechos of early Spanish explorers in New Mexico. They style themselves Atsina. This is apparently another form of Asinais or Cenis, a confederation of tribes visited by La Salle at this point, and subsequently by Spanish missionaries and French traders. The Arapahoes, like the Asinais, are by language allied to the Caddoes. At the present time they are one of the five tribes constituting the

Blackfeet confederacy. In 1822 they were a powerful tribe estimated at 10,000, but in 1842 they had dwindled to 2,500 in 300 lodges, and, with the disappearance of the buffalo, are rapidly declining.

ARARAT (Arm. *Masis;* Turk. *Agri Dagh*), a mountain of western Asia, considered a portion of the "mountains of Ararat" on which, according to Gen. viii. 4, Noah's ark rested after the deluge. It is divided into two peaks, Great Ararat on the N. W. and Little Ararat on the S. E., whose bases blend, while their summits are nearly 7 m. apart. The summit of Great Ararat lies in lat. 39° 42′ N., lon. 44° 38′ E., and is 17,323 feet above the sea level, and 14,820 feet above its base. For more than 3,000 feet below its summit it is constantly covered with snow and ice. Little Ararat is lower by about 4,000 feet, and is free from snow and ice in September and October. The two mountains are of volcanic character, an eruption having taken place from them as lately as July, 1840. The apex of Great Ararat was visited on Oct. 9, 1829, by Parrot. Ararat is the central point of the dividing lines of Armenia, and the great landmark between Russia, Turkey, and Persia.

ARARAT, or Pilot Mountain, a mountain of North Carolina, in Surrey county, between the Ararat and Dan rivers. It is of a pyramidal form and one third of a mile high; and its top is a plateau one acre in extent, on which is a gigantic rock 300 feet high.

ARAS. See Araxes.

Mount Ararat.

ARATUS. I. A Greek poet, born at Soli in Cilicia, flourished about 270 B. C. He was educated under Dionysius of Heraclea, a Stoic, the principles of which sect he embraced. He was a friend of Ptolemy Philadelphus, and also of Antigonus Gonatas, king of Macedon, at whose instigation he embodied most of the astronomical knowledge then possessed by the Greeks in two philosophical poems. The first, *Phænomena*, gave a general description of the heavenly bodies and their movements, while the second, *Diosemeia*, described their influence on the atmosphere. These poems possess much merit. Aratus is the poet whom St. Paul quotes in his speech on Mars Hill, Acts xvii. 28. The best edition of his works is by Buhle (2 vols. 8vo, Leipsic, 1793, 1801).

II. A Greek general and statesman, son of Clinias, born at Sicyon, 271 B. C., died in 213. On account of the murder of his father and many of his relatives by Abantidas, their enemy in one of the political contests of the time, he was taken while very young to Argos, where he was educated till he reached the age of 20. At this period he succeeded in carrying out, without bloodshed, a revolution he had long plotted with some Argive friends, by which Nicocles, a usurper who had made himself tyrant of Sicyon, was dethroned and the city set free. Aratus persuaded the citizens to join the Achæan league, of which he was elected general in 245. Reëlected in 243, he captured the citadel of Corinth and expelled its Macedonian garrison. Corinth was easily induced to join the Achæans, and was soon followed by Trœzen, Epidaurus, Megara, Cleonæ, Argos, and Megalopolis. He now hoped to unite all the governments of Greece; but the power of the Achæan league already began to excite the jealousy of the Ætolians, and of Cleomenes III., king of Sparta, who aspired to restore the Spartan hegemony. Its first active enemy was the latter, who began a war about 224. Aratus defeated him, but only by summoning to his aid Antigonus Doson, king of Macedon, and by taking the unfortunate step of delivering to him Corinth and its citadel as the price of his assistance. Antigonus took advantage of this offer, which at once proved fatal to the power of the Achæan cities. He became general of the league, and gradually gained complete control of it, transmitting this authority to his son Philip. Aratus remained a prominent leader in spite of the Macedonian rule; but in a new war which soon broke out with the Ætolians (221 to 219), he was unsuccessful. He was tried for neglect of duty, but acquitted in consideration of his past services. From this time he was little more than an adviser of the Macedonian king, who had now made the league completely dependent upon himself; and although appointed general for the 17th time in 217, he never attained his old influence. According to Plutarch and Polybius, whose story has been doubted by many historians, he was put to death by slow poison, given by Philip's order. The Greeks paid divine honors to his memory, and celebrated twice a year games called Arateia—one on the anniversary of his birth, and one on that of his deliverance of Sicyon.

ARAUCANIANS, an Indian nation inhabiting the provinces of Arauco and Valdivia, Chili. The name is derived from the Indian word *auca*, meaning frank, or free. As offering the most successful example of Indian self-government in the presence of the European races, the Araucanians are of interest to the philosopher and the ethnologist. The chief authority with regard to them is "Molina's History of Chili," of which an English translation was published at Middletown, Conn., in 1808. Five different poems have been written by Europeans upon their patriotic struggles against the European invaders. The best are the *Araucana* of Alonso de Ercilla, a Spanish knight of the 16th century, who took part in the wars he describes, and the *Puren Indomito* of Alvarez de Toledo (Paris, 1862). The Araucanians were first invaded by the Spaniards in 1537. Valdivia founded many settlements in their country, which with the settlers were destroyed in 1602. In 1641 the marquis de Baydes made a treaty with their chief, but in 1665 war commenced again, and lasted at intervals until 1773, when Spain at length acknowledged the independence of the Araucanians, and allowed them to maintain an embassy at Santiago de Chili. In the contest between the mother country and the Chilian colonists, they preserved a strict neutrality. Schmidtmeyer visited them in 1820, and published his "Travels into Chili, over the Andes," in 1820–'21. Mr. Edward Reuel Smith, of the U. S. astronomical expedition in Chili, published "The Araucanians, or Notes of a Tour among the Indian Tribes of Southern Chili" (New York, 1855).—The territory of Arauco has been from time immemorial divided into four *vuthanmapus* or *uthalmapus*, or provinces, each presided over by a magistrate called a *toqui;* these four provinces correspond to the natural divisions of the country, viz., the maritime province, the plain province, the province at the foot of the Andes, and the province in the Andes. Each of these is divided into five *illarehues*, ruled by an *apo-ulmene*, and each illarehue is further subdivided into nine *rehues* or townships, over each of which presides an *ulmene*, or head of a clan. The symbol of a toqui is an axe of porphyry or marble; of an apo-ulmene, a staff with a silver head and a silver ring round the middle; of an ulmene, the same without the silver ring round the middle. All of these dignities are hereditary according to primogeniture. No regular tribute or any predial service is payable by the clan to the ulmene, by the ulmenes to the apo-ulmene, or by the apo-ulmenes to the toqui. In time of war, however, military service is acknowledged as the most sacred of duties. The four toquis, or governors of provinces, form the grand council of the Araucanian federation, presided over by one of its own members, the grand toqui. This council decides on war and peace, and on emergencies calls together the general assembly. At this diet, every toqui, apo-ulmene, and ulmene may attend; it chooses the commander-in-chief from among the four toquis; but if none of them are qualified, then from the diet at large. The levy is made by the ulmenes upon their several clans. The army consists of both cavalry and infantry. The toqui Cadeguala was the first who established a regular body of cavalry, in 1585. The diet is held in a large plain which lies between the rivers Biobio and Dunqueco. The religion of the Araucanians is akin to their political institutions. Their Supreme Being is the great toqui of the universe; he has his subordinate ulmenes to look after details. These are, the god of war, the beneficent god, the god of mankind, and others. Guecubu is the god of evil. The celestials exact no tribute from their subjects here below; therefore the Araucanian builds no temples nor idols, supports no priests, and rarely offers sacrifice. After the death of the body, the soul goes into paradise, a region which lies on the other side of the Andes. Their religion, in other respects, resembles other primitive creeds. They hate the Spanish language, and their toquis, though well acquainted with it, will never use it on any public occasion. They make a foreigner take an Araucanian name before he is allowed to settle among them. A missionary, when preaching to them, is often interrupted in the midst of his discourse, if he commits a blunder. The Araucanians are stoutly built, and of moderate height. Their complexion is olive, and lighter than the other South American Indians; they have a round face, low forehead, short, broad nose, small, fiery eyes, small lips, and long head. The women do all the home and field work; the men hunt, fight, and tend the flocks. They live in wooden or reed plastered houses, well built, and often 60 feet by 25 in size, not in villages, but in the centre of their plantations. They raise wheat, maize, and barley, peas and beans, potatoes, cabbages, and fruit, as well as flax, and keep numbers of cattle and horses. Before the arrival of the Europeans they wove ponchos and coarse woollen cloths of very good workmanship. Their language is very wide-spread, and had nine recognized dialects. It was spoken from lat. 25° S. to Cape Horn, and eastward to Buenos Ayres. The best grammar is the Chilian grammar of Febres (Lima, 1765; Santiago, 1846). Molina's account has been accused of exaggeration, and may be compared with the works of Gilj, Havestadt, Falkner, &c.—In 1861 a Frenchman named De Tonneins, having ingratiated himself with the tribes, was proclaimed king of Araucania under the title of Orélie Antoine I. He was soon at war with Chili, and was captured in January, 1862, on Araucanian territory. The arrest was pronounced illegal, but the Chilian government held him some time as a lunatic, permitting him finally to go to France, where the validity of his regal title was formally recognized in the course of a lawsuit. He published *Orélie-Antoine I^{er}, roi d'Araucanie et de Patagonie, et sa captivité au Chili* (1868). He afterward returned to Araucania, and in 1869–'70 was again at war with Chili; but in 1871 he was once more in France, and began publishing an official Araucanian journal at Marseilles, striking medals, establishing orders of knighthood, &c. He left in Araucania a deputy, one Planchut, who soon usurped the regal title.

ARAUCO, a southern province of Chili, divided into the three departments of Arauco, Laja, and Nacimiento; area, 13,500 sq. m.; pop. in 1868, 82,709, besides some 35,000 Indians. Capital, Arauco, on a bay of the same name, 300 m. S. of Valparaiso. This province was created by decree of Dec. 7, 1852; but the Araucanian Indians still maintain their independence in the interior.

ARAXES (now *Aras*), a river in Armenia, rising about 25 m. from Erzerum, in lat. 41° 30′ N., lon. 41° 10′ E., between the E. and W. branches of the Euphrates. It flows E., S. E., and N. E., and after a course of about 425 m. unites with the Kur about 75 m. from its mouth in the Caspian. It is notable for the impetuosity of its current. Virgil describes it as "disdaining a bridge," but it is now crossed by four stone bridges. There can be little doubt that the Aras is the river descended by Herodotus under the name of Araxes, although Rennell thinks the Jaxartes was meant; and it has been supposed also to be the Oxus, and even the Volga. By Araxes Xenophon probably intended the Chaboras, an affluent of the Euphrates.—The river now known as the Bendamir was also called Araxes. It rises in central Persia, flows past the ruins of Persepolis, and after a course of about 150 m. falls into the salt lake of Bakhtegan or Negris, in lat. 29° 30′ N., lon. 52° 30′ E.

ARBACES, the founder of the Median empire, according to Ctesias, who asserts that Arbaces, jointly with Belesis of Babylon, captured Nineveh and overthrew the empire of Sardanapalus (876 B. C.), that he reigned 28 years, and that his dynasty numbered eight kings. These statements differ from those of Herodotus.

ARBALAST, or **Crossbow.** See ARCHERY.

ARBELA, the ancient name of Arbil or Erbil, a small village in Turkish Kurdistan, which lies on the usual route between Bagdad and Mosul, about 40 m. E. by S. of the latter city, in lat. 36° 11′ N., according to the elder Niebuhr's observations. The third and last of the great battles between Alexander and Darius (331 B. C.) is called after this place, though it was not actually fought at Arbela, but at a place 36 m. W. by N. called Gaugamela, now Karmelis.

ARBITER, a Roman umpire, chosen by an agreement (in the Roman law *compromissum*) between contending parties, to decide their differences. His decision was called the *arbitrium.* Such a judge, chosen by the parties themselves, was an *arbiter receptus.* An *arbiter datus* was appointed by the prætor to decide in matters purely of equity, while the *judex* decided in matters of law and precedent. The duties and rights of these officers, with the extent to which the decisions of an arbiter could be enforced, were sharply defined by the Roman law.

ARBITRATION, the decision by a private person of matters of difference submitted to him by the parties. References differ from arbitrations in that they are made with the sanction of the court, or at least are more directly under its control, and are govered by the rules of law more strictly than arbitrations are. The law is not disposed to take away the ordinary means of relief by action or other proceedings at law, unless suitors have clearly signified their intention to give them up in favor of arbitration. The New York court of appeals has held void an article of the constitution of a grand lodge of odd fellows, which created certain members a tribunal to pass upon violations of the rules of the order, with power to forfeit the delinquents' right to property. Even if the defendants had signed such a constitution, the court said it would be against public policy to hold them bound by it, and that courts would not enforce the decision of tribunals created by private compact, except in those cases where the parties had expressly submitted to arbitration definite matters of controversy. In a recent case in New York city, the court held that the so-called "arbitration clause" in the articles of association of the board of brokers could have no other effect than an ordinary agreement to submit; and the court declined to give a remedy against a member of the board who declined to submit to its jurisdiction, for that was only the exercise of the ordinary power of revocation.—As a general rule, all matters in dispute concerning personal rights which may be the subject of actions may be referred to arbitration; such, for example, as breaches of contracts, differences about partnership affairs, the value of property, and questions of damages in cases of wrongs like assaults, trespass, or slander, where damages might be recovered by suit. Claims relating to real estate might at common law be submitted to arbitration. In such a case an arbitrator might direct that one party convey or release to the other. But a practical objection to this proceeding, so far at least as titles to land are concerned, is that the property in the land cannot pass by the award. In some of the states the statutes relating to arbitrations forbid the submission of certain matters pertaining to real estate. Thus in New York no submission can be made of claims to the fee or to life estates in realty; but the same restraint is not imposed as to interests in terms for years, nor to controversies as to boundaries, partitions, or the measurement of dower. Nor are equitable rights relating to real estate withdrawn from arbitration. The policy of the statute in these respects has been said in New York to be to withdraw from the unlearned forum of arbitration those questions of title to lands which depend on strict technical rules; and that, since equitable claims even in respect to titles depend rather on the general principles of justice, they may be well submitted.—In general, a crime cannot be withdrawn from the cognizance of the courts. But where a person has a remedy by action for private damages, collateral to the public remedy by indictment, as in cases of assault, libel, or nuisance, he may submit the question of his personal interests to arbitrators.—Persons who are competent to contract are also capable of submitting their affairs to arbitration. It was the general rule at common law that married women could not make a submission, though there were exceptions to that rule in favor of women whose husbands were civilly dead or alien enemies. But since the enabling acts which have been lately very generally introduced, giving to married women separate estates, and independent powers and capacity to contract in respect to them, they have been held capable of consenting to arbitrations. An infant's submission is at common law, like most of his contracts, voidable by him. But it has been held with regard to such agreements of infants, and of married women too, who had not the liberty of contracting which is conferred by the recent married women's acts, that if an award is made against a party who entered into an arbitration with either of them, it will bind him, even though the woman or the infant cannot be held by it, because he must be presumed to have known that at the outset, and if he did not intend to be bound, he should not have joined in the submission. Whether one partner can bind his copartners by an agreement to arbitrate has been much discussed, and the weight of authority seems to be against his power to do so. But such an agreement may bind the partner who made it, and he may be held for the damages resulting from the refusal of his copartners to perform the award.—In the absence of statutes to the contrary, the submission need not be in any special form, nor even in writing. But in most of the states, under the statutes on the subject, a submission may be made a rule of court; that is to say, the parties may agree that the proceeding be entered of record in a court, and then the award upon confirmation has the effect of a judgment of that court, and may be enforced with the same legal remedies provided for judgments. These statutes require the submission to be in writing and executed with certain formalities. The statutes usually require that the arbitrators shall be sworn, and that the witnesses shall be sworn also, either by them or by justices of the peace or other competent persons; and that the attendance of witnesses may be compelled by subpœnas issued either by the arbitrators themselves or by justices or other judicial officers. But it has been held in New York, though its statute requires the arbitrator to be sworn, that this is not an essential prerequisite to his jurisdiction, and that the omission of the oath is only an irregularity. When the submission provides for the appointment of an umpire by the arbitrators to decide between them if they disagree, this third person should be agreed upon before proceeding with the arbitration.—The hearings by the arbitrators should be on notice to both parties; and if they proceed *ex parte* and without notice to the party against whom the award is made, it is void. All the arbitrators must concur in the award, unless it is otherwise provided by statute or by the submission; and when it is provided that, in case of their disagreement, the decision of the umpire shall be final, the award should in case of such a reference to the umpire proceed from him and be signed by him. The award must dispose of all the questions contained in the submission, and must conform to its terms in all respects. If it includes matters not covered by the submission, it will be good for so much as is authorized by it, if that part can be separated from the rest; but if it departs essentially and incurably from the submission, it is fatally bad. The award must be certain in its terms; that is, it must inform each party precisely what he is to do. It must also be final and conclusive in all respects.—The statutes of the several states usually define the grounds on which awards may be set aside. In New York they may be vacated, on application to the court, for corruption or fraud or partiality on the part of the arbitrators; or if they were guilty of misconduct in refusing postponements, or in rejecting proper evidence, or exceeded their powers or imperfectly executed them in material points. And in the same state awards may be corrected for evident mistakes or for other imperfections. Very similar statutory provisions exist in Illinois, Missouri, and other states. In several of the states it is also provided that an award may be vacated by the courts for any legal defects appearing on its face.—The chief vice or weakness in the proceeding by arbitration is the power which either party has to revoke the authority given by him to the arbitrators. The only practical penalty for such a breach of the agreement, and even when there are bonds fixing precise sums by way of liquidated damages, is that the party who revokes must pay the expenses incurred by the other up to the revocation. In some of the states, as in Massachusetts and Maine, the statutes provide that neither party shall revoke the submission without the consent of the other. But in other states, as in New York and Missouri, the only restraint is, that no revocation shall be made after the cause is finally submitted to the arbitrators upon the evidence. The death of a party pending the proceedings operates as a revocation, unless it be expressly provided otherwise by the submission, or, as is the case in some of the states, by statute.—A submission suspends, and an award bars, the right of suit on the original cause of action. The award must be made within the time directed by the agreement, and it is a nullity if made after that time, unless the parties consent to an extension of the time. The power of the arbitrators is exhausted by delivery of the award, and though in making it they have exceeded their powers or otherwise erred, they cannot recall it or make another one. The courts have repeatedly held that when not limited by the terms of the submission, the decisions of the arbitrators upon law and fact alike, provided that they act within the scope of their authority, are conclusive. If the award is within the submission, and contains an honest and fair decision, a court of equity will not set it aside for error either in law or in fact. Judge Story and other high judicial authorities have further declared that arbitrators are not bound to award upon the mere dry principles of law applicable to the case before them, but may make their award upon principles of equity and good conscience. On the other hand, if the submission expressly provides that the case shall be decided according to the law, and the arbitrators make a mistake in that respect, this will subject the finding to revision by a court. In Pennsylvania, under a statute enacted in 1836, either party to a civil action may compel a submission of it to arbitrators by filing a rule in the prothonotary's office calling for such a reference, and by serving a copy of the rule on his opponent. The number of the arbitrators, three or five or one, is fixed by the parties, or, if they cannot agree, by the prothonotary. The parties then by alternate nominations select the arbitrators; but if they cannot agree upon these, the prothonotary makes up a list containing five names for each of the number of the arbitrators, from which the parties alternately select the requisite number.—In England a statute of 1867 provides for councils of conciliation and arbitration, which may be formed by masters and their workmen. These councils exercise powers granted by former statutes of similar tenor (1 Victoria, ch. 67, and 8 and 9 Victoria, ch. 77, 128), and by the present statute are authorized to hear and determine all questions of dispute and difference between the workmen and their masters; and their awards are final and not subject to review or challenge in any court. No attorneys, solicitors, or counsel are allowed to attend any hearing before the councils, without the consent of both sides. The courts of *prudhommes* are courts of a similar sort in France. They are established in Paris and Lyons and some of the other large cities, and take cognizance of disputes between master manufacturers and their workmen, and between workmen and their apprentices. The court is composed of master workmen or manufacturers and of foremen, six of each, one half of the number going out each year. The court acts first as a court of conciliation; and if it fails to bring the parties to an agreement, it has jurisdiction to the amount of 200 francs without appeal, and to any higher amount subject to appeals to a tribunal of commerce. It is said that almost all the cases brought before these courts are settled by conciliation.

ARBLAY, Madame d' (FRANCES BURNEY), an English novelist, daughter of Charles Burney, born at Lynn in June, 1752, died Jan. 6, 1840. In her childhood she was silent and timid, and was considered uncommonly dull. In 1760 her father removed to London, and was much sought as a music teacher. After her mother's early death Frances was left to educate herself. Dr. Johnson was her father's friend, and Garrick his frequent guest, and the brilliant social circle in which he moved afforded rich material for genius to work upon. Miss Burney soon gave evidence that she rightly appreciated her privileges. In 1778 her novel "Evelina" was published, under an assumed name, by a Mr. Lowndes, who gave her £20 for the copyright. Though the author of the book was unknown, and the publisher was not eminent, its success was marvellous, and Miss Burney was at once classed among the first writers of fiction. "Evelina" was followed by a comedy, "The Witlings," which was never acted, nor even printed, and in 1782 appeared the novel of "Cecilia," which was successful. Three years after this she was appointed keeper of the queen's robes. After five years' service she resigned this post on account of her failing health, and in 1793 married Alexandre Richard d'Arblay, a French artillery officer, whom the revolution had made an exile. In 1796 "Camilla" was published in five volumes, bringing the author a handsome sum of money, but no increase of fame. Ten years, 1802-'12, she passed in Paris, her husband having given in his allegiance to Napoleon's government. At the expiration of this term she returned alone to England and produced another novel in five volumes, "The Wanderer," which had little popularity, and is now almost forgotten. At the peace her husband, now Gen. d'Arblay, joined her, and remained with her till his death, at Bath, in 1818. In 1832 Madame d'Arblay published the memoirs of her father, written in a turgid style, entirely at variance with her earlier diction. This was the closing work of her long life, which ended when she was 87 years old. The literary fame of Madame d'Arblay rests upon "Evelina" and "Cecilia," her earliest works.

ARBOGAST (Arbogastes), a Gaul in the military service of the Romans during the latter half of the 4th century. In 388 he accompanied Theodosius on his expedition to support Valentinian II. against the usurper Maximus. After the revolt was reduced, Arbogast, by the order of Theodosius, remained with Valentinian as adviser; and when the latter attempted to recover his independence, Arbogast put to death all his partisans, and finally the emperor himself. Not daring to seize upon the imperial purple, he gave it to Eugenius, going himself to fight against Marcomir, chief of the Franks. Theodosius marched into Italy to avenge his cousin, and Arbogast and Eugenius were defeated near the passes of the Julian Alps, in 394. Eugenius was captured and executed. Arbogast escaped into the mountains, but soon despairing, committed suicide.

ARBOIS, a town of France, in the department of Jura, situated in the deep valley of the Cuisance, 25 m. N. E. of Lons-le-Saulnier; pop. in 1866, 5,895. The town has a college, and produces a noted wine.

ARBOR VITÆ, a coniferous tree (*thuja*), with compressed evergreen foliage forming flattened branches, strongly aromatic. Varieties are found throughout the northern temperate regions of both continents. The tree bears pruning well, and may be trimmed into conical or pyramidal standards, or worked into an excellent hedge. In its wild state the American arbor vitæ (*T. occidentalis*) has loose spreading branches when growing on the edges of streams, but it becomes bushy in cultivation. Its height varies from 20 to 50 feet, and it is one of the largest of all the species. The Chinese, Nepaulese, Siberian, and Tartarean are all beautiful varieties and easily cultivated, although in northern New England they are apt to lose their branches by frost. The *thuja plicata* is a curious variety from Nootka sound, with singular foliage. The cone of *thuja* is small, and in ripening assumes a vertical position on the branches.

American Arbor Vitæ.

ARBRISSEL, Robert of, founder of the order of Fontevrault, born at Arbrissel, Brittany, in 1047, died at Orsan in 1117. In 1085, upon his appointment as vicar general of the bishop of Rennes, he began sweeping reforms among the clergy and people of the diocese, which brought him into such bad odor that upon the death of his superior in 1089 he retired to Angers and gave instructions in theology. At the expiration of two years, disgusted with the world, he retired into the forest of Craon, where he lived as a hermit. Numerous anchorets soon placed themselves under his direction, and he gave his followers the name of "The Poor of Christ." In 1096 he founded the abbey of La Roe, of which he became the first prior, but soon relinquished this peaceful life to travel barefooted through the country, preaching repentance and penance to the people. He soon had several thousand followers of both sexes, for whose accommodation he built a number of abbeys, the most celebrated of which is that of Fontevrault, near Poitiers, established in 1099.

ARBROATH, Aberbrothwick, or **Aberbrothock,** a royal and municipal burgh of Forfarshire, Scotland, on the North sea, at the mouth of the Brothwick or Brothock, 58 m. N. N. E. of Edinburgh; pop. in 1871, 19,974. The town has a signal tower communicating with the Bell Rock lighthouse, which has been celebrated by Southey as the Inch Cape Rock under the pious care of the abbot of Aberbrothock. The once powerful abbey of Arbroath, founded in 1178 by William the Lion, who is buried here, in honor of Thomas à Becket, was destroyed by the reformers in 1560. All that remains of it is the ruined church with its cloisters, and an east window with a circular light at the top, a conspicuous mark for sailors, who call it the "round O of Arbroath." The small harbor is protected by a breakwater. Between 400 and 500 vessels enter and leave the port annually, with between 30,000 and 40,000 tons. There are four annual fairs and a weekly market. The imports are tallow, flax, hemp, and linseed; the exports grain, paving stones, and the local manufactures of sailcloth, thread, and leather.

ARBUTHNOT, John, a Scottish physician and writer, born in Kincardineshire about 1675, died in London, Feb. 27, 1735. He was the son of a Presbyterian clergyman, took his doctor's degree at the university of Aberdeen, and going to London, supported himself for a while by teaching mathematics. He made his first literary venture in 1697 in a critical essay entitled "An Examination of Dr. Woodward's Account of the Deluge," in which he aimed to show that a universal deluge was inconsistent with philosophical truth. The reputation which this work gave its author was considerably heightened in 1700 by his "Essay on the Usefulness of Mathematical Learning." He now began to practise as a physician, and quickly attained a high position in the profession, aided not a little by his witty conversation and agreeable manners. In 1704 he contributed to the royal society a paper concerning the regularity of the birth of both sexes, which procured his election into that body. In 1709 he was appointed the queen's physician in ordinary, and the next year was admitted a member of the royal college of physicians. He lived in constant intercourse with Pope, Swift, Gay, Parnell, Gray, and Prior, in whose brilliant circle he was unequalled for learning and wit. In 1712 he wrote the "History of John Bull," a political allegory, designed to ridicule the duke of Marlborough and render the war unpopular. It is the most durable monument of his fame, and one of the best humorous compositions in the English language. He formed in 1714, in conjunction with Swift and Pope, the plan of writing a satire on the abuse of human learning in every branch. The design was to be executed in the humorous manner of Cervantes, in the form of a history of feigned adventures. It was frustrated by the death of Queen Anne, by which Arbuthnot lost his place, and a serious blow was given to all the political friends of the associated wits. The design was never carried further than an imperfect though witty and original essay, written chiefly by Arbuthnot, under the title of "First Book of the Memoirs of Martinus Scriblerus." Dr. Arbuthnot visited Paris immediately after the death of the queen, and on his return continued his literary occupations and his medical practice. In 1717 he and Pope gave assistance to Gay in a farce entitled "Three Hours after Marriage," the failure of which is explained in part by the peculiar character of Arbuthnot's humor, which was something too refined and rare to be generally appreciated. In 1723 he was chosen second censor of the royal college of physicians, and in 1727 was made an elect of the college, and pronounced the Harveian oration. In 1727 also appeared the most valuable of his serious performances, entitled "Tables of Ancient Coins, Weights, and Measures." He continued to write humorous papers, among them a remarkable epitaph upon the infamous Col. Charteris. In 1732 he contributed toward detecting and punishing the impositions of the so-called "Charitable Corporation," and shortly afterward published his essays concerning "The Nature and Choice of Aliments," and "The Effects of Air on Human Bodies." He was then living in great debility at Hempstead, and, failing to obtain relief, returned but a short time before his death to London. His last humorous work was an entertaining and scholar-like paper on "The Altercation or Scolding of the Ancients." Arbuthnot was equally admired for his amiability and his wit. Some of his writings are so blended with those of his confederates that they are not easily distinguished.

ARBUTUS, a genus of evergreen shrubs belonging to the natural order *ericaceæ*. The fruit is a berry containing many seeds. The most remarkable species of this genus is the arbutus of Virgil, called the *A. unedo*, or the strawberry tree, the berries of which bear a strong resemblance to the common strawberry. It is a native of the south of Europe and the Levant. In northern Europe it is a hardy evergreen, sometimes attaining to a height of 20 feet, bearing greenish-yellow blossoms in October and November, and bright yellow and red berries in November and the following months. At the lake of Killarney in Ireland there are beautiful groves of this species of arbutus, which give a charming aspect to the country. Its berries, if eaten freely, are apt to produce stupefaction. In Corsica a pleasant wine is said to be prepared from them. Its bark and leaves are astringent. The oriental arbutus, *A. andrachne*, is a native of the Levant, and has similar narcotic qualities. It is superior in beauty, but much less hardy in cold climates, not bearing fruit in northern Europe. Its leaves are broader and less serrated; its bark peels off so as to leave the stem always smooth, and of a clear bright cinnamon-brown color. The mule arbutus, *A. hybrida*, apparently a cross between these two, has great beauty of foliage, and in moderately cold regions grows well, but does not bear berries in northern Europe. *A. procera* is a native of California, cultivated as an ornamental evergreen in the gardens of Great Britain.—The trailing arbutus (*epigæa repens*) is

Arbutus unedo, or Strawberry Tree.

a plant of the same order, but of a different genus. It takes its generic name (Gr. ἐπί and γῆ, upon the ground) from its trailing lowly habit, and its common name Mayflower from the season of its blossoming. The leaves are alternate, coriaceous, and evergreen; the stems and other portions of the plant are covered with reddish, bristling hairs; and the cluster of very fragrant white or pink flowers appears in the axils of last year's leaves. It is found throughout New England, especially near the coast, on the edges of pine forests, and it also grows in great perfection in the valley of the Connecticut. It is also called ground laurel.

Trailing Arbutus (Epigæa repens).

ARC (Lat. *arcus*, a bow), the name of any portion of a curved line; thus, an arc of a circle is a portion of the circumference. To rectify an arc is to give the length of the straight line to which it would be equal if it were made to have the same length in a right direction which it now has in a curved. Two arcs are said to be equal when, being rectified, they have the same length; and similar when, being taken from different circles, they have the same number of degrees—that is, are equal fractions of their respective circumferences. The arcs of a circle serve to measure the angles (see Angle); if from the vertex of the angle as a centre, with whatever radius, a circumference be described, the number of degrees of the arc intercepted between the two lines which form the angle will be the measure of the angle. Thus, for instance, as the arc of 90° corresponds to a right angle, if we find that the intercepted arc contains 15°, we conclude that the angle is to a right angle in the ratio of 15° to 90°, or that it is the sixth part of a right angle. The chord of an arc is the right line which joins its extremities; a segment is the area included between an arc and its chord; and a sector is the area included between an arc and the two radii going from its extremities to the centre of the circle.

ARC, Joan of. See Joan of Arc.

ARCACHON, a village of France, in the department of Gironde, 35 m. by railway W. S. W. of Bordeaux; pop. about 2,000. It is situated on a landlocked bay or lake (bassin d'Arcachon), about 60 m. in circumference, connected with the gulf of Gascony by a narrow strait. Since 1854 the village has been converted into a watering place by the Péreire family, who bought the surrounding woods and swamps, and drained part of the bay. Previous to the Franco-German war the visitors annually averaged 5,000. Persons suffering from diseased lungs are much benefited in winter by the mildness of the climate. The beach is very fine, and sea bathing attracts in summer many visitors. The pine woods extend almost as far as Bayonne, and abound with game.

ARCADIA, the central and, next to Laconia, largest of the ancient divisions of the Peloponnesus; area about 1,700 sq. m. It included the most picturesque and beautiful portion of Greece. The country embraced by its ancient boundaries is mountainous, with many forests, but it contains also rich meadow lands, and rivers and brooks abound. Mount Cyllene in the northeast, Erymanthus in the northwest, and Lycæus in the southwest, are some of its mountains most frequently mentioned by the ancients. The Alpheus was its principal stream, and Stymphalis its largest lake. It had neither seaports nor navigable rivers. Pausanias says its name was derived from that of Arcas, son of Callisto. In the most ancient times its inhabitants, of Pelasgic origin, were hunters and rough shepherds; but they gradually turned their attention to agriculture and to raising cattle. Their habits were simple, and the quiet and happiness of their life among the mountains, their fondness for music and dancing, their hospitality and pastoral customs, made the Arcadians pass among the ancients for favorites of the gods. Pan and Diana were their principal deities. The poets have chosen Arcadia for the scene of many idyls, until its name has become the synonyme for a land of peace, simple pleasures, and untroubled quiet. In spite of this the Arcadians were, like nearly all mountain races, a brave and martial people, and, though they produced no great military leaders, were almost constantly engaged in war, either on their own account or as the mercenaries of others, fighting bravely even against their own countrymen for those who hired them. They fought in the ranks of both contending parties in the Peloponnesian war, and at the battle of Issus thousands of them were slain in the army of Darius, by Alexander. The principal cities of Arcadia—Mantinea, Tegea, and Orchomenus—engaged in frequent and injurious disputes among themselves. Against the Spartans the Arcadians (about 370 B. C.) built the city of Megalopolis, and organized a general assembly. They subsequently became confederates in the Achæan league, and on its final defeat in 146 B. C. fell under the Roman power. Thenceforth they have no separate history from that of the empire, and of mediæval and modern Greece.—At present Arcadia, comprising the larger part of the ancient division, with the addition of the ancient district of Cynuria and a part of Laconia, forms one of the nomarchies of the kingdom of Greece, bounded E. in part by the gulf of Nauplia; area, 2,028 sq. m.; pop. in 1870, 131,740. Capital, Tripolitza.

ARCADIUS, the first of the Byzantine emperors, born in Spain, A. D. 383, died in Constantinople, May 1, 408. He was the elder son of Theodosius the Great, the last ruler of the whole Roman empire. In 395, a few months before his death, Theodosius divided the empire between his two sons, Arcadius and Honorius, giving to the former the eastern part, extending from the Adriatic to the Tigris and from Scythia to Ethiopia. Arcadius ruled at first under the regency of Rufinus, who was soon assassinated at the instigation of his rival, Stilicho, the regent of Honorius. Eutropius, a eunuch, afterward became regent, and held the place till 399, when Tribigild, a Gothic chief in Phrygia, revolted and compelled Arcadius to put his favorite to death. Trigibild and his tribe also obtained permission to pass the Bosporus and settle on the European side; but being Arians, they were massacred or driven out by the people of Constantinople. In revenge for this the empress Eudoxia, who had now acquired the absolute control over her husband, caused Chrysostom, the great adversary of Arianism, to be banished to Comana in Pontus (404). Arcadius was a contemptibly feeble man, but of strict religious orthodoxy.

ARCESILAUS, a Greek philosopher, the founder of the Middle Academy, born at Pitane in Æolis about 316 B. C., died about 241. He was originally intended for a rhetorician, but while pursuing his studies at Athens decided to devote himself entirely to philosophy, and succeeded Crates in the chair of the academy of Athens. From the little we know of his opinions, it seems that he was a skeptic, but not in the Pyrrhonic sense of that term; and his celebrated saying, "that he knew nothing, not even his own ignorance," seems to have been but an utterance of humility. He was also distinguished from the pure Pyrrhonists by his predilection for questions appertaining to practical life, and by the undeviating moderation of his tone.

ARCH (Lat. *arcus*, a bow), a curved structure supported by its own curve. An arch is distinguished from a vault by its length being much less than its width, as is the case with the arch forming the roof of a door or of a window; but this distinction does not apply to structures built entirely above ground and open on both sides, as the arch of a bridge or a triumphal arch. It was long supposed that domes were unknown to the Egyptians and early Greeks, the first arched monument on record being the *cloaca maxima* of Rome, built in the age of the Tarquins; but it is now certain that arches were used by the Assyrians and Babylonians long before the foundation of Rome, and also that the Egyptians were acquainted with the principle of the arch, though they did not see fit to make use of it to any great extent.—The earliest arches in Italy were built by the Etruscans. The original Etruscan dome was supported by a few pillars, under which stood the augurs; the object was to protect the priest against the sun and rain, and at the same time allow him to study the horizon and be seen by the people. The Romans scarcely deviated from the semicircle, which is the simplest form of the arch, and in building it did not follow true mechanical principles; so that the great strength of their numerous aqueducts, viaducts, and monuments is to be ascribed to their massiveness and to the good cement employed. It was not till the middle ages that the arch was properly built and widely used. Strong abutments are generally found around the monuments of that period, which consist of a succession of arches built one above the other, from the ground to the top of the monument, the uppermost one being used as an aqueduct for the roof gutters, appearing from below as light as if made of tin plate. The roofs of many of these edifices are formed of large arches as main ribs, which sustain smaller arches abutting on them; they are as slender as possible, and so appropriately shaped and ornamented as to appear much lighter than they are. The wedge-shaped stones of which an arch is composed are called voussoirs; the uppermost is the keystone; the two blocks of masonry on which the arch rests are the abutments; the line from which the arch springs is called impost; the inner curve, intrados or soffit; the curve outside the voussoirs, extrados; the span is the distance between the piers; the distance of the keystone above the impost is the height of the arch. The names of the parts of the arch proper are, the springs of the arch, the haunches, and the crown. When the arch has only to support itself, each voussoir sustains the weight of those placed above it, and consequently they must be made larger and larger from the crown to the spring; but when the arch has to support weights, the various modes in which they may be disposed require as many different constructions, and the finding of the resulting force acting on each part is one of the most difficult tasks of the architect. The use of arches in the form of an arc smaller than a semicircle is comparatively recent, and superior for many purposes to older forms. In bridges, for example, it leaves in ordinary times a larger passage for boats, and in times of freshet offers less resistance to the water, and the bridge runs less risk of being carried down. Since the introduction of cast iron in architecture, arches of that metal and of a single piece have been built; in such cases the arch is used only to please the sight, as the solidity of the structure depends entirely on other portions of the work.—A triumphal arch is a monumental structure erected in honor of some celebrated person and his deeds, or to commemorate some great event. Triumphal arches probably originated with the Romans, and L. Stertinius is the first recorded who erected such a monument. Two were built by him, one about 196 B. C. in the Forum Boarium, and another in the Circus Maximus. A few years later, Scipio Africanus built one on the Clivus Capitolinus, and in 121 Q. Fabius Maximus erected one on the Via Sacra. Of these none remain. Different writers record 21 as having been built in the city of Rome. The most celebrated Roman arches are those of Augustus at Rimini, of Trajan at Beneventum and Ancona, and those of Titus, Drusus, Septimius Severus, and Constantine at Rome. That of Titus is one of the best. It is situated at the foot of the Palatine, and was probably completed after his death and apotheosis, as in the inscription he is called Divus. It commemorates his conquest of Judea. Remains of Roman arches are to be seen in Spain, Greece, and other countries. The custom of raising magnificent triumphal arches began under the first emperors. During the republic arches were decreed to victorious generals, but not to the dead. When Augustus was emperor, the senate proposed to have one built in honor of Drusus the elder, who died in Germany. Augustus consented, and a marble arch was constructed on the Appian Way.—Paris, of all modern cities, has the most numerous and the most beautiful arches. The Portes St. Denis and St. Martin were erected in 1673–'4; the arc du Carrousel in the years 1806–'9, in honor of the armies of France. The latter is at the W. entrance of the Tuileries; its height is 47 feet, its breadth 55. Its two principal faces have each eight Corinthian columns, surmounted by statues. The most magnificent is the arc de l'Étoile, at the extremity of the avenue des Champs Élysées, built for the purpose of commemorating the victories of Napoleon. (See PARIS.) The arch at Hyde Park corner, with the equestrian statue of the duke of Wellington, and Cumberland gate, are the only specimens in England.

ARCHÆOLOGY (Gr. ἀρχαῖα, ancient things, and λόγος, discourse), the science of antiquities, and especially of human antiquities in general. The primeval period of man has been divided into the stone, the bronze, and the iron ages. Sir John Lubbock, in his "Introduction" to Nilsson's "Primitive Inhabitants of Scandinavia," subdivides the stone age into the palæolithic and neolithic, the former the older and the one in which the stone implements are not polished, as they are in the latter. The antiquities of this epoch are found in beds of loam and gravel extending along the river valleys of central Europe (the *loess*), sometimes 200 feet above the present water level; they were evidently deposited by existing rivers, which ran then as now and drained the same areas; they contain no marine remains, and each valley is characterized by fragments of the rocks in its special area. The geography of western Europe was very much the same as now, the only variations being in the ever-changing coast line and the depths of the river valleys. The animals then living were the hairy mammoth, woolly rhinoceros, hippopotamus, and most of the existing mammals, especially tigers, hyænas, and bears, ruminants and rodents, of very great size. The climate was then colder than now, as the musk ox, woolly pachyderms, reindeer, and lemming extended to the south of France. It must have taken a very long time for the extinction of these large mammalia; there is not the most vague tradition of their presence in western Europe, and there are no marks of sudden destructive cataclysms. It must have required many centuries for rivers to excavate their valleys more than 200 feet. The presence of man is indicated at this period in western Europe by his bones and implements of unpolished flint, without pottery or any of the metals; similar implements have been found in the caves of France and Spain. (See BONE CAVES.) From all the evidence collected by the above-named authors, it would seem that the people then living in the south of France resembled the Esquimaux of the present day, their chief food being the flesh of the reindeer; they were ingenious workers in flint, bone, and horn, and fond of making rude drawings on the horn of the mammoth and other existing animals. A cold climate is also indicated by their habit of allowing bones and offal to accumulate in and near their cave dwellings. The cave period is probably less ancient than the gravel epoch, and, from the abundance of their remains, is often called the "reindeer" period. In the *Reliquiæ Aquitanicæ*, by Messrs. Lartet and Christy, there is a full account of the archæology of the old stone age, as exhibited in the south of France, especially in the caves in the valley of the Dordogne and of Cro-Magnon and Moustier. These caves belong to the age of simply worked stone, without the accompaniment of domestic animals or implements of polished stone; bones of the reindeer are abundant, and the coexistence of man with this animal in latitudes so much lower than its present habitat implies a certain degree of elevation above savages, as not only food, clothing, and implements, but materials for ornamentation were obtained from it. In the earlier gravel period, the mammoth, rhinoceros, horse, and ox predominate, the reindeer prevailing in the Dordogne caves, but in neither are found remains of the dog, goat, and sheep; the same is true of the gravels and caves in England, in central France, and in South Wales. Birds and fishes, especially the salmon, were eaten; and everything shows that food was not so scarce as to demand any struggle for existence. The domestic economy of these early races is shown by their hearths, boiling stones, rough hammers, and hollowed dish-like pebbles; there is a total absence of pottery. The remarkable similarity of the stone implements from different parts of the world is worthy of notice; this form of primitive industry has been traced in Europe from Greece to Scandinavia, and from the Atlantic coast to the steppes of Russia; in Asia, it appears from Palestine to the Malay archipelago, in India and Japan, and on the shores of the Arctic ocean; in America, from Behring strait to the plateau of Mexico, from Colombia to the Atlantic, from Peru to Tierra del Fuego, along the valley of the Amazon and its tributaries, in central Brazil, and in the West Indies; and the ancient weapons resemble those now used by the natives of New Caledonia and the Esquimaux. M. Pruner-Bey, from the examination of skeletons found in the cave of Cro-Magnon, maintains that the crania of the reindeer age, which he calls Mongoloid, belong to a double series, one approaching the Lapp and the other the Finn of the present day; the skulls of the Dordogne caves, different from both these, he refers to the Esthonian type. From the low and projecting bony palate, he thinks the language of the cave dwellers was neither Aryan nor Semitic, but analogous to that of the Finnish races. He concludes that they had massive bones, long and flat feet, comparatively short arms and long forearms, with powerful muscles, greatly developed jaws, widely opened nostrils, and were of unbridled passions. Prof. Broca found the human thigh bones in their width approaching those of the highest apes, and a remarkable transverse flattening of the tibia; the ascending branch of the lower jaw was very wide, and the cranial capacity equal to that of high races of the present day. In reply to M. Broca, M. Quatrefages cautions anthropologists against too hastily giving undue significance to assumed agreements between fossil man and apes, from any preconceived views of the origin and descent of the human race.—The neolithic or polished-stone age was separated by a considerable interval of time from the old stone age. Many thousand polished-stone implements are collected in the museums of northern Europe and America; they are not found in the river-drift gravels, and are especially abundant in Denmark and Sweden, while the ruder implements of the palæolithic age are unknown there, indicating that these northern countries were not inhabited during the earlier period. No bones of the reindeer nor of the great extinct mammals are found with the polished implements, and nothing made of metals; arrow heads and rough chisels would continue to be made in this, and even in the next and the present ages, while the metals were rare and costly. The Danish shell mounds are the refuse heaps of the people around their dwellings or temporary stopping places; they contain no remains of reindeer, but bones of the domestic animals, and all kinds of household objects lost or broken, including rude pottery made by hand. Similar shell heaps have been found in the United States, especially along the seacoast, marking the former dwelling places of the aborigines of this continent; several of these have been described by Prof. J. Wyman in vols. i. and ii. of the "American Naturalist" (1868). They are found from Maine to Florida, and are made up of the shells of the mollusks used by them as food, especially the clam and quahog, with bones of the elk, deer, beaver, bear, dog, various fur-bearing mammals, birds, and especially the great auk, now believed to be extinct; occasional pieces of charcoal, and implements of bone and stone, but no human remains, are found. The growth upon them of large trees proves that they must be several centuries old, though not so ancient as the shell heaps of Denmark; they show a great variety of animal food, to say nothing of the vegetable; they afford no trace of any intercourse with European nations. The layers are from ½ to 3 feet thick, and sometimes 250 feet long and 40 or 50 wide, and near the seashore, which has evidently been raised since their deposition; there are sometimes several layers, separated by earth, indicating successive occupations. Some of the lake dwellings of Switzerland (see Lake Dwellings) belong to this age, while those yielding metal implements belong to the next or bronze age. There are evidently two classes of these lake dwellings. Many burial mounds contain flint daggers and stone implements, and none of metal. Bodies in the stone age were either buried in the sitting posture or were burned; they were rarely, if ever, extended at length. Bones of the dog in the shell heaps, and of the ox, sheep, goat, and pig in the lake villages, lead to the belief that these animals were then domesticated; the domestic fowl and the cat were unknown. The hunting had by this time given place to the agricultural state, as we find corn-crushers, blackened wheat, barley, and flax in the lake dwellings, but no oats, rye, nor hemp; tissues of woven flax are met with. Even at this early period two kinds of skulls are found, one long and the other round, indicating the existence of at last two human races, the first perhaps belonging to men of the stone age, and the last to the bronze period, which was now coming on. In the villages of the Swiss lakes the houses were built on wooden platforms extending over the water, resting on piles driven into the mud. Similar villages have been found in Italy, Savoy, the French Jura, Germany, Scotland, and Wales; and from their number and size they must have been the centres of a numerous population, a single one having had more than 40,000 piles. Some of the people on the coast of Borneo and in parts of Polynesia make their huts on similar platforms at the present day. The charred posts and grains indicate that these villages were destroyed by fire.—In the succeeding or bronze age, implements and arms of this alloy were extensively used, and many are preserved in collections; stone implements and arrow heads are found with the bronze, showing that the former serviceable material was still used. The later Swiss villages and many tumuli or mounds belong to this period. Bones of the domestic animals and cultivated plants are found instead of wild ones; the piles of the villages are cut squarely with metal, and not irregularly by stone or charred by fire; the pottery shows marks of the wheel; gold, amber, and glass were used for ornamental purposes, though silver, lead, zinc, and iron appear to have been unknown; there were no coins in use, and there are no signs of writing or inscriptions; skins were worn, though tissues of flax and wool were also used; the ornamentation is geometrical, consisting of lines, circles, zigzags, and triangles, much as is now seen on the mats made by the tribes of central Africa; the handles of the arms and bracelets indicate a small race. The use of bronze proves commerce, and the tin must have been brought from Cornwall, and copper must have been used before bronze. As copper implements are not found in western Europe, it is probable that the knowledge of bronze was introduced into and not discovered in Europe; it could not have been introduced from Italy, as the Romans never entered Denmark, and such implements have rarely been found in Italy, and none of the peculiar leaf-shaped bronze swords, so common now in the north, are seen in southern museums. If such are of Phœnician origin, as Prof. Nilsson maintains, it must have been before their historic period, as they were familiar with iron from the earliest known times.—After a transition period, during which bronze was used with iron, as proved by iron instruments with bronze handles, though never the reverse, we come to the iron age, which leads directly to the historic. In this the weapons and cutting instruments were generally made of iron; such were in use by the Britons at the time of the Roman invasion; coins were employed, and silver was used for ornamentation of the person and of implements; the pottery was much better, and the weapons were more artistically made and ornamented. Neither bronze nor stone weapons were used in northern Europe at the beginning of our era, and the people of the north and west were considerably above the savage state. The resemblance of the rude implements in the old and in the new world, in the same stage of civilization, is very striking.—M. Lartet makes only two prehistoric ages, the stone and the metal. The stone age he divides into—1, that of the extinct mammals, like the mammoth and the cave bear; 2, that of the migrated existing animals, the reindeer epoch; 3, that of the domesticated existing animals, the polished-stone age. The metal age he subdivides into the bronze and the iron ages. According to him, primitive man lived in a comparatively cold, barren, and wet earth, presenting no fruits for his sustenance, and no opportunity for agriculture; essentially predaceous and carnivorous, an eater of raw flesh, and a cannibal, like many savage races of the present day; with small skull and brain, retreating forehead and prominent jaws, short but robust, below even the New Zealander and Australian of to-day; and paying a great and superstitious respect to the dead. In the reindeer period there was an advance, as shown by the more symmetrical though unpolished weapons, but as yet no agriculture; the great mammals began to disappear, and to be replaced by smaller and more useful forms. The mastodon was evidently known to the founders of the Central American cities, and its figure is pictured on their walls; as the mastodon survived the mammoth, the former came down almost to the historic period. During the reindeer epoch the glaciers again advanced, and the climate became cold, though to a less degree and for a shorter time than before; after this came another warmer period, when the glaciers melted, causing the floods which as deluges enter into the traditions of so many nations; then the great mammals were exterminated, and the reindeer and the arctic animals retreated to the north, where they have since remained. In the next epoch, with a continued mild climate, man became agricultural, had polished implements, and made the dog his companion. In the bronze age man made still greater advances, domesticating animals, cultivating grains and fruits, and smelting metals, especially copper. The iron age insensibly merges into the historic period. The mound-builders M. Lartet considers intermediate in civilization between the polished-stone and the bronze epochs of Europe, not in time, but in stage of advancement; they lived in towns, and were not only hunters, but miners, potters, weavers, agricultural, artistic, and commercial. The stone, bronze, and iron ages do not indicate definite periods of time in man's civilization; every race goes through these ages, some more rapidly than others. Some eastern nations had probably passed out of their stone age at least 3,000 years B. C.; some in northern and central Europe were in this age when Cæsar subjugated Gaul; the Sandwich islanders were in their stone age in the time of Capt. Cook; the Esquimaux and the North American Indians generally are now in their stone age; it is simply the age of the infancy of the race. In America the copper preceded the bronze age; the latter existed when the Spaniards first visited Mexico and Peru. The mound-builders of the Mississippi valley used implements of pure copper, hammered cold, obtained from the region of Lake Superior; they preceded the Aztecs. Judging from the forests overlying this old civilization, the copper age must have been at least 1,000 years ago. Africa had no bronze age, passing from the stone to the iron age, on account of the exceptional occurrence of iron there, which the natives work skilfully both cold and hot. The men of the iron age in Europe were probably the Celts, conquered and described by the Romans. The Esquimaux, the Australian, and the North American Indian will probably never pass beyond the stone age, and will finally become extinct, the first from climate, and the last two from contact with superior races with which they cannot compete. It is most likely that the savage Ligurians and Iberians described by Cæsar as living in caves, and conquered by him, were the southern representatives of the old stone age, while the Finns and Lapps are the more modern and northern remains of the later stone age. The American Indians, the shepherds of Tartary, and the African races have no written history of their own; this has been attained only in comparatively recent times even by the civilized nations of Europe. From geographical causes the Tartars have always been migrating shepherds, occasionally uniting in formidable hosts, the scourges of more civilized races, as when eastern Europe was overrun by the hordes of Genghis Khan and Tamerlane.—For full information on the subject of archæology, the reader is referred to the writings of Christy, Lartet, Boucher de Perthes, and Quatrefages in France; Schaffhausen, Virchow, and Lindenschmit in Germany; Thomsen, Engelhardt, Steenstrup, and Nilsson in Denmark; Troyon, Keller, Morlot, Vogt, and Desor in Switzerland; Gastaldi, Canestrini, and Foresi in Italy; Schoolcraft, Squier, Foster, Davis, Whittlesey, and Wyman in the United States; Crawfurd, Prestwich, Boyd Dawkins, in England, and to Lyell's "Antiquity of Man," and Lubbock's "Prehistoric Times." For details on the stone age, see Nilsson's "Primitive Inhabitants of Scandinavia" (1868). (See supplement.)

ARCHÆOPTERYX (Gr. *ἀρχαῖος*, ancient, and *πτέρυξ*, wing), the name given by Owen to the recently discovered long-tailed or reptilian bird of Solenhofen, one of the connecting links between the reptile and the bird, which made its appearance, as far as known, during the oölitic epoch of the jurassic period. In the mesozoic age, not only the mammals but the birds had reptilian characters, and the earliest birds had long vertebrated tails. The tail in *A. macrurus* (Owen) was 11 inches long and 3½ wide; it consisted of 20 vertebræ, with a row of feathers along each side, the feathers being in pairs corresponding to the number of vertebræ, and diverging at an angle of 45°; the last pair extended backward nearly in the axis of the tail, and 3½ inches beyond it. The wing appears to have had a two-jointed finger, and its breadth was made by feathers as in birds, and not by an expanded membrane as in the pterodactyl and other flying reptiles; the feet were also like those of birds, and its body was covered with feathers. As we know comparatively little of the terrestrial reptiles of the triassic or preceding period of the mesozoic age, and very little of its bird-like forms beyond that afforded by the footprints in the Connecticut valley, it is expected by naturalists friendly to the doctrine of evolution that future researches will reveal birds more reptilian than the archæopteryx, and bird-like reptiles, which will go far toward filling the gap which now exists between reptiles and birds.

Archæopteryx, Restored.

ARCHANGEL (Russ. *Arkhangelsk*). **I.** The northernmost government of European Russia, bounded N. by the White and Polar seas, E. by the Ural mountains, and S. and W. by Vologda, Olonetz, and Finland. It includes the islands of Nova Zembla, Vaygatch, Dolgoi, and Kolguyev, and has a continental area of about 290,000 sq. m., and an estimated total area of about 340,000 sq. m.; pop. in 1867, 275,779. It is watered by the Petchora, Mezen, Dwina, and Onega, all of which flow north. Lapps, Finns, and Samoyeds, many of them still heathen, form the native population, living independently among the conquering Russian settlers. The country is covered with immense forests. The soil yields vegetables, oats, barley, hemp, and flax. The principal towns besides the capital are Kola, Kem, Onega, Pinega, and Mezen. **II.** The capital of the preceding government, named after a monastery dedicated to the archangel Michael built there in 1584, situated on the river Dwina, 30 m. from its mouth in the White sea, 450 m. N. E. of St. Petersburg, in lat. 64° 32′ N., lon. 40° 33′ E.; pop. in 1867, 20,178. It has a military and a civil governor, an archbishop, a high school or gymnasium, a navy yard, and several private ship yards. For nearly a century and a half, previous to the construction of St. Petersburg, Archangel was the principal and indeed the only mart of the Russian import and export trade. As early as the time of Queen Elizabeth English merchant ships occasionally entered the mouth of the Dwina, and they were soon followed by those of the Dutch and the German Hansa. The harbor is large and one of the best in northern Europe, though somewhat obstructed by a sand bank at the entrance. Archangel is still one of the principal points for the trade with the interior of Russia and with Siberia, the Dwina being connected by canals with the Volga, and thus with Moscow and Astrakhan. The ice disappears in April, and the navigation closes in September. The principal objects of trade are fish, fish oil, tallow, linseed, furs, hides, lumber, wax, iron, linen, bristles, and caviare. In 1855 the harbor of Archangel, defended by a fort, resisted the English attacks. Archangel, being able to receive the largest men-of-war, soon afterward became one of the chief places for the construction and maintenance of the Russian navy. The buildings of the admiralty or navy board, as well as the barracks for sailors, are situated on the island of Solombalsk. In summer Archangel sends out numerous fishing boats, and in winter hunters to the utmost northern regions, such as Spitzbergen, Nova Zembla, and the mouth of the Lena in Siberia. A special company has been formed in Archangel for the herring fishery. In 1868 the exports to Great Britain, consisting chiefly of linen goods (805,890 pieces) and oats (8,728,244 bushels), were valued at £960,938, and the total exports at £1,504,211.

ARCHBISHOP (Lat. *archiepiscopus*), the chief of the bishops of an ecclesiastical province. The first formal sanction of this authority was by the council of Nice, in 325, which distinguished the bishops of the capitals as metropolitans, and the more eminent of the metropolitans were termed archbishops or patriarchs. In the 8th century the title was applied to every metropolitan and to the more eminent of the bishops. Since that time, in Roman Catholic countries, the archbishops have had a more definite position in the hierarchical scale, ranking next below patriarchs, although their prerogatives have considerably varied. They possess a double character, exercising over their own diocese ordinary episcopal functions, and also having a limited jurisdiction over the bishops of their province, who are termed suffragans. They claim the right of calling provincial synods, of presiding at them, and publishing their acts; also the right of supervision; and an appeal lies to them from the decisions of the bishops. The archbishop also supplies benefices left vacant by the bishops for a longer time than that prescribed by the canons, and receives the bulls of the pope, which he announces to his suffragans. The symbol of his superior authority is the pallium, a band of white woollen worn around the shoulders.—The archiepiscopal dignity has been retained in the Greek and Anglican churches. The ecclesiastical government of England is divided into two provinces, Canterbury and York. The archbishop of Canterbury is the chief primate and metropolitan of all England, first peer of the realm, and member of the privy council. It is his prerogative to crown the king, and he is consulted by the ministry in all ecclesiastical affairs, and generally delivers in parliament the sentiments of the bench of bishops. The archbishop of York crowns the queen, and is her chaplain. He also belongs to the privy council, but his inferiority to the archbishop of Canterbury is recognized in his being styled simply primate of England, while the latter is styled primate of all England. The two archbishops have precedence of all temporal peers excepting those of the blood royal, and excepting the lord chancellor, who in processions is interposed between them. The archbishop of St. Andrews was the metropolitan of Scotland while episcopacy prevailed in that country, and the archbishop of Armagh is primate of all Ireland. —In Denmark the bishop of Copenhagen has precedence of the others, but the bishop of Seeland is the metropolitan, and anoints the king. In Sweden the bishop of Upsal is the sole archbishop. In Germany, three of the archbishops, those of Treves, Cologne, and Mentz, were electors of the empire.

ARCHDEACON (Gr. ἀρχιδιάκονος, chief minister), an ecclesiastical dignitary, the assistant of the bishop. At the beginning of the 4th century there was in almost every diocese an archdeacon, invested with authority by the bishop, particularly in the administration of temporal affairs. To him belonged the care of preserving public order and propriety during the divine service, of guarding the ornaments of the church, and of tending the poor throughout the diocese. He was called the hand and the eye of the bishop, and, from his influential position, became recognized as superior to the priesthood, though retaining only the deacon's consecration. As overseer of the deacons and of the younger clergy who were not yet consecrated, he had the supervision of their education and studies, so that a certificate from him was required before their ordination to the priesthood. When the dioceses began to enlarge, and the metropolitan churches to attach to themselves the neighboring country congregations, it became necessary to divide the diocese into a number of archdeaconries. The archdeacons increased in independence and power till the 13th century, when they claimed a jurisdiction proper to themselves, and the right to appoint their own subordinates. Several synods sought directly to limit their prerogatives, and it was finally decreed by the council of Trent that henceforth the archdeacons should hold their right of supervision only by the bishops' permission. From that time they have gradually disappeared from many dioceses. England is divided into 67 archdeaconries, and it is imperative upon each archdeacon to visit his district at least once in three years. It belongs to him to see that the churches and chancels are in repair, that everything is done conformably to the canons, and to hear from the churchwardens any representations of public scandal. The archdeacons are appointed by their respective bishops.

ARCHDUKE (Ger. *Erzherzog*), a German title in use from very early times. We find among the Franks archdukes of Austrasia. The title also existed in Lorraine and Brabant, and was especially assumed by the house of Austria, though there is no positive historical record as to when or why it was granted to them by the emperors. The Kahleberg branch of the house of Austria or Hapsburg has used the title since 1156, but without special privileges.

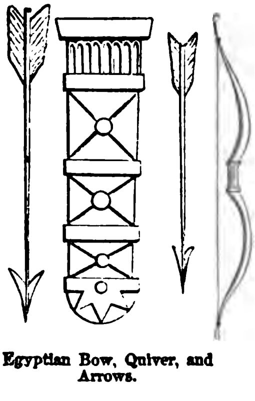
It became hereditary in that line after the promulgation of the golden bull, but the electors did not recognize its validity till 1453. It is supposed, however, that Maximilian I. extended this dignity to his branch of the family, attaching to it various privileges, and placing the archdukes in every respect above all other crowned vassals of the German empire. The Hapsburgs have preserved it ever since; and since the assumption by the emperor Francis of the title of emperor of Austria (1804), all the male and female members of that house have been called archdukes or archduchesses.

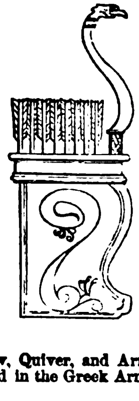
ARCHELAUS. **I.** Surnamed Physicus, or the Naturalist, a Greek philosopher, supposed by some to have been a native of Athens, by others of Miletus. He flourished about the middle of the 5th century B. C., and was a pupil of Anaxagoras. Archelaus is said to have been the first philosopher who taught physics in combination with ethics, at least in Greece. He held that the antagonism of heat and cold caused the separation of fire and water, and produced a slimy mass of earth; that the action of heat upon the moisture of this mixture generated animals, originally nourished by their native mud, and gradually becoming capable of propagating their species; that these animals were all endowed in different degrees with intellect; and that man, separating in time from his brother animals, rose to his superior condition. He held also the doctrine that "right and wrong are not from nature, but from custom." After the banishment of Anaxagoras from Athens, Archelaus established himself in that city, and is said to have instructed Euripides and Socrates. **II.** A king of Macedon, from 413 to 399 B. C. He was, according to Plato, an illegitimate son of Perdiccas II., and a monster of cruelty. If we may believe Thucydides, however, Archelaus, by erecting fortresses, forming roads, and adding to his military strength, established the basis on which Philip and Alexander raised the superstructure of Macedonian power. He instituted public games at Ægæ, or at Dium, which he dedicated to the muses and Zeus. He was a lover of literature, science, and the fine arts. His palace was adorned with paintings by the greatest Grecian masters, and was the resort of Euripides, Agathon, and other distinguished men. Archelaus is said to have been slain at a hunting party by his favorite Craterus, but whether accidentally or deliberately is not known. **III.** The greatest of the generals of Mithridates the Great of Pontus, born in Cappadocia. He commanded the army which his master sent against Nicomedes, king of Bithynia, whom he encountered in Paphlagonia, and completely defeated. On the outbreak of the terrible struggle known in Roman history as the first Mithridatic war, he was sent with a naval and military force into Greece. He subdued many of the Ægean islands and compelled the Athenians to take part against the Romans; but when Sylla became his opponent his triumphant career terminated. At Chæronea and Orchomenus, in Bœotia, his Asiatic myriads were overthrown and almost annihilated (86 B. C.), and he was himself driven to flight and concealment. Mithridates now commissioned Archelaus to negotiate with his conqueror. The two generals met at Delium, where Sylla is said to have vainly endeavored to induce Archelaus to betray his sovereign. Afterward a preliminary treaty was concluded, which was not approved by Mithridates; but Sylla by the advice of Archelaus had an interview with the king at Dardanus (84), and there made with him a treaty so favorable to the Romans, that henceforward Archelaus, the principal mediator in the matter, was regarded as a traitor, and had ultimately to take refuge with his former antagonists from the vengeance of his king. **IV.** Son of the preceding, was made by Pompey in 63 B. C. priest of the goddess of war at Comana in Cappadocia. This office conferred on him the power of king over Comana and its territory. When Berenice, queen of Egypt, proclaimed that she was desirous of marrying a prince of royal blood, he pretended to be the son of Mithridates, won her hand, and presently found himself king of Egypt. Gabinius, the proconsul of Syria, having espoused the cause of Ptolemy, marched an army into Egypt, where a battle was fought in which Archelaus lost his crown and his life after a reign of six months. **V.** Son of the preceding, succeeded to the office of his father at Comana. In 51 B. C., having aided the insurgents in Cappadocia, he was expelled from his dominions by Cicero, then proconsul of Cilicia. After the Alexandrian war he was deprived of his office by Julius Cæsar, who gave it to one of his own adherents. **VI.** Son of the preceding, was made king of Cappadocia by Mark Antony, in 36 B. C. Augustus confirmed him in the possession of his kingdom, and even added to it a portion of Cilicia and Lesser Armenia. Archelaus was once accused at Rome by his own subjects, but he had Tiberius for an advocate on the occasion, and was acquitted. But afterward, while sojourning in Rome, Archelaus was so impolitic as to offend Tiberius, and when the latter became emperor he invited the king to visit Rome once more, and, as soon as he came, had him accused before the senate of meditating treason. His old age saved his life, but he was compelled to remain in Rome, where he died soon after (A. D. 17). On his death Cappadocia was converted into a Roman province. **VII.** A son of Herod the Great, was proclaimed king by the army on the death of his father (4 B. C.). Shortly after his accession a sedition broke out, in the suppression of which he manifested the cruelty of his nature. He then went to Rome to solicit from the emperor the confirmation of his title, which was disputed by his brother Antipas. Dividing the kingdom between them, Augustus gave Archelaus the sovereignty of Judea, Samaria, and Idumea, with the title of ethnarch. On his return from Rome he transgressed the Mosaic law by taking to wife Glaphyra, the not childless widow of his brother Alexander. In the 10th year of his reign he was accused by the Jews before Augustus of various crimes, and being found guilty, was deprived of his dominions, and banished to Gaul (A. D. 8), where he died. **VIII.** A sculptor, a native of Priene, and the son of Apollonius. He is supposed to have lived in the reign of Claudius. He made the marble bass-relief representing the apotheosis of Homer. This work is now in the British museum.

ARCHENHOLZ, Johann Wilhelm, baron, a German author, born at Langenfurt, a suburb of Dantzic, Sept. 3, 1745, died near Hamburg, Feb. 28, 1812. He served in the Prussian army from 1760 to 1763, and afterward spent 16 years travelling over Europe. On his return to Germany he devoted himself to literary pursuits, and lived successively at Dresden, Leipsic, Berlin, and finally at Hamburg. His work on "England and Italy," and his histories of Queen Elizabeth and Gustavus Vasa, enjoyed popularity; but his most valuable work is that on the seven years' war. His "Annals of British History since 1788" are piquant and full of anecdote. In his "Historical Essays" he gives an account of the filibusters and pirates who infested the West Indies during the 17th century. From 1782 to 1791 he edited a periodical called *Literatur und Völkerkunde*, and from 1792 to the time of his death he was editor of the *Minerva*.

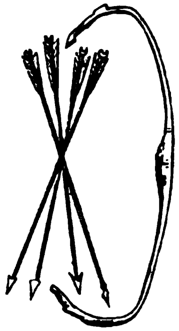
ARCHER, an unorganized county in N. W. Texas, near the Indian territory, watered by branches of the Wichita river; area, 900 sq. m. This county was returned as having no population in 1870, its settlement having been delayed by Indian depredations. It has but little good farming land, but is well adapted to stock raising, having fine grass in abundance and plenty of water. The county is regarded as one of the most valuable in the state for its minerals, among which is bismuth.

ARCHERY, the art of shooting with the bow, which is probably the oldest weapon for use in other than hand-to-hand combats, and the earliest implement of the chase. The mention of the bow in the oldest portions of the Hebrew Scriptures, and its constant appearance in the sculptures of Nineveh and of Egypt, show that it was used by the oriental nations from the earliest times; and these nations long preserved their superiority in its use; for the Greeks and Romans, who themselves made little use of the bow, though they employed foreign archers as mercenaries, found in their wars with eastern races that bowmen formed the chief strength of their enemies. The Cretans, however, excelled in the use of that weapon. The Persians, Parthians, and Numidians were among the best archers of antiquity of whom we have authentic record. In India and China the bow was also the chief weapon; and it was probably of the same form as those now known in these countries, though seldom used.—But the great period of archery began with the Norman conquest of England, when the longbow, originally a weapon of the Norse tribes, and brought into western Europe by Duke Rollo, was used with such effect by the Normans that the Saxons found no weapon to successfully oppose it. Upon the amalgamation of the two peoples into one nation, it became the English national weapon, and was rapidly made famous. The proper length of the longbow was the height of the archer using it. The arrow was half as long as the bow; from 60 to 90 lbs. was the force needed to draw a fitting arrow to the head on a bow six feet long. Such an arrow was called "a cloth-yard shaft," from the measure, a cloth yard or three feet. The longbow was made of Spanish yew, English yew, or ash—mentioned in the order of their excellence for the purpose. Arrows were made of ash, oak, and yew, weighed from 20 to 24 pennyweights, were tipped with steel and feathered with goose feathers. The bowstrings were of plaited


Egyptian Bow, Quiver, and Arrows.

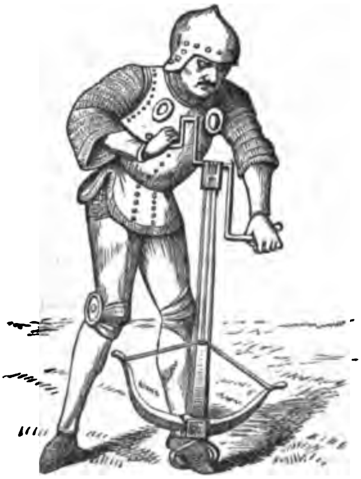

Bow, Quiver, and Arrows used in the Greek Armies.

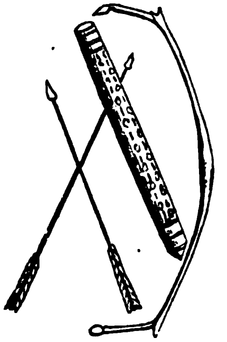
Chinese Bow and Ornamented Quiver.

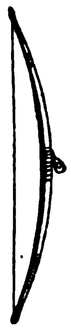

Bow and Arrows used in India.

English Longbow.

silk. The power of flight, correctness of aim, and penetration of these terrible missiles were prodigious. In shooting matches, 300 feet was the common range, and the ordinary mark was a straight willow or hazel rod, as thick as a man's thumb and five feet long; and such a mark a good archer held it a shame to miss. At 200 feet no armor but the best Spanish or Milan steel plate could resist the English arrow; and the legends of men and horses shot through and through are proved by corslets of the stoutest plate, preserved in several collections, where the shafts have been driven through the breastplate and the whole body of the wearer, and then through the steel backplate, not inferior in strength to the breastplate. In shooting, the longbow was held perpendicularly at arm's length, and the bowstring drawn back until the arrow feathers were opposite the right ear.—While the English archers were the best in the world, and their longbow was the most formidable weapon, several nations of continental Europe acquired great dexterity in the use of the crossbow or arbalast. This consisted of a bow fixed transversely at the end of a wooden stock somewhat resembling a modern gun stock; along the top of the stock ran a barrel slit nearly to the muzzle, in such a manner that the string of the bow could pass through the slit and be drawn along it until caught by a trigger; this latter being pressed, the string was released, and swept forward with great force along the slit barrel, discharging the bolt or arrow which had been placed in it. Sometimes the arrow was placed in a simple groove in the top of the stock, along which the released string swept. This bow was generally of steel, and so strong that a steel winch was often fixed to the stock for the purpose of drawing back the cord. In shooting, the crossbow was aimed from the shoulder, like a musket. The Genoese were famous crossbowmen, and several provinces of France furnished good archers.—Archery disappeared as firearms came into use; and as an instrument of war and the chase, the bow is now confined to the most savage tribes. Many of the North American Indians were expert with the bow; but they early adopted the musket or the rifle, and now, except among the most remote frontier tribes, the bow is never seen unless in the hands of children or as an implement for catching fish. The Comanches, however, are an exception, for to this day their force consists in their skilful archery. Their bows are short, and their arrows clumsily pointed; but they are properly feathered, and the warriors discharge them with such force that they have been known to pass entirely through the body of a bison. Many African tribes still use the bow.


Crossbow.


Bow and Arrows of the North American Indians.


African Bow.

ARCHERY, Modern. See supplement.

ARCHES, Court of, one of the ten English ecclesiastical courts, so called because its sittings were formerly held in the church of St. Mary-le-Bow (*Sancta Maria de Arcubus*) in London, whence they were in 1567 transferred to the hall of the doctors' commons. This court has original jurisdiction in most ecclesiastical causes arising in 13 parishes in London, which form a deanery. The presiding officer, called the dean of the arches, is also the deputy of the archbishop of Canterbury, so that the court of arches has an appellate jurisdiction in all ecclesiastical causes arising out of the diocese of York. Formerly the jurisdiction of this court was very extensive, especially in matrimonial and testamentary matters; but these have within a few years been transferred from the ecclesiastical courts to the crown, and divorces to the divorce court. The practitioners in the ecclesiastical court are styled doctors, advocates, and proctors, and must before admission to practice obtain the fiat of the archbishop, and then be duly admitted by the dean of the arches. This court has now but little business to do; but the dean, as president of the college of doctors of law, is usually constituted principal judge in admiralty.

ARCHIAS, Aulus Licinius, a Greek poet, born at Antioch toward the close of the 2d century B. C., and well known to us only through the oration of Cicero in his defence. When a young man he went to Rome, and was treated with much attention by the leading men of the republic, and especially by the Licinian family, whose name he assumed as a token of respect. He attended Licinius Lucullus, the prætor, to Sicily, and afterward to Heraclea in Lucania, whither his patron was banished for his conduct in the servile war. He was with the younger Lucullus in Asia during the first and third Mithridatic wars, and in the interim he accompanied him into Africa. He at length returned to Rome, where an accusation was brought against him for having assumed without just title the privileges of a Roman citizen. The case was tried before Q. Cicero, who was then prætor, and whose relative, Marcus Tullius, undertook the defence. The result is unknown. Cicero and Quintilian assert that the poems of Archias were equally remarkable for beauty of style and variety of thought. They are all lost, except some epigrams preserved in the Greek Anthology, if indeed these be justly attributed to him.

ARCHIATER (Gr. ἀρχίατρος, chief physician), a title which seems in the first place to have been purely honorary and not official. In the times of the Roman emperors Greek physicians were encouraged to come to Rome and enter the imperial service; and it was to one of these, Andromachus the elder, that the title archiater was first given by Nero. What was intended only as a personal compliment to Andromachus passed rapidly into an institution, and archiater became a designation of a class. The archiatri were divided into two classes, the city archiatri and the court archiatri. Later it came to be a civil requirement (under Antoninus Pius) that small cities should have five archiatri, large ones seven, and the largest ten. The archiatri were salaried officers, and were expected to treat the poor gratuitously. As perquisites, they charged the rich for practice, and also had certain stipends called *annonaria commoda*. It was also considered a part of their duty to teach medical science, and to exercise a general supervision over the health of their medical dioceses and the practice of the inferior physicians. The archiatri were usually elected by the suffrages of physicians. In Sweden and Denmark the order still exists.

ARCHIBALD, Adams G., a British colonial statesman, born at Truro, Nova Scotia, May 18, 1814. He studied law in Halifax, was called to the bar in 1839, was elected a member of the legislature of Nova Scotia for the county of Colchester in 1851, and was reëlected in 1855. Next year he became solicitor general in the government of Mr. Young, then a leader of the liberal party, and was reëlected to the legislature by acclamation. Mr. Archibald had a large share in breaking up the mining monopoly which, under a grant of George III. to the duke of York, held all the coal and other mines of Nova Scotia, under the name of the general mining company. In 1863 he carried a bill through the legislature of Nova Scotia which substituted for the universal suffrage a somewhat restricted franchise. He was one of the delegates to the intercolonial convention held at Quebec in 1864; and his advocacy of that scheme of union cost him his seat when he next appeared for reëlection. In the cabinet of Sir John Young, which was formed in 1867, he was president of the council and secretary of state for the provinces, and in 1871 he was appointed lieutenant governor of Manitoba. This office he resigned in the beginning of 1872.

ARCHIDAMUS, the name of five kings of Sparta, of the Proclid or Eurypontid line. The first of the name, son of Anaxidamus, lived during the war with Tegea, about 668 B. C. The second, son of Zeuxidamus, reigned 469–427 B. C. In 464 occurred the terrible earthquake which almost destroyed Sparta, when Archidamus by his energy probably saved the surviving citizens from massacre by the helots. He commanded in the wars against the revolted Messenians. In the discussions at Sparta and Corinth prior to the rupture with Athens he was prominent as an advocate of peace and moderation. In the Peloponnesian war he commanded three expeditions against Attica and one against Platæa. His grandson ARCHIDAMUS III., son of Agesilaus II., reigned 361–338 B. C. In 367 he had defeated the Arcadians and Argives in the "tearless battle," so called by the Spartans because they did not lose a man; and in 362 he had successfully defended Sparta against Epaminondas. In the sacred war he aided the Phocians against the Macedonians with money and men, but toward its close he retired on the approach of Philip, leaving the Phocians to their fate. He was killed in Italy, in a battle fought in aid of the Tarentines, on the day of the battle of Chæronea. ARCHIDAMUS IV., his grandson, and son of Eudamidas I., is only known from his defeat by Demetrius Poliorcetes in 296 B. C. ARCHIDAMUS V., last of the Proclid line, son of Eudamidas II., possessed himself of the throne in 240 B. C., but was soon slain by the murderers of his brother and predecessor Agis IV.

ARCHIL, or **Orchil** (Span. *orchilla;* Fr. *orseille*). The red, violet, and blue colors which are known in commerce under the names of archil, cudbear, and litmus are supplied by different species of lichens, *rocella*, *variolaria*, *lecanora*. The *rocella* tribe grow upon rocks on the seacoast in the Canary islands, Sardinia, and Corsica, at the Cape of Good Hope, and on the W. coast of South America. Archil is prepared by digesting the lichens in a hot solution of ammonia, allowing it to stand for a few hours, and exposing the clear solution, which is drawn off from the lichen, in deep jars, to the air for about three weeks; the solution when concentrated by evaporation forms the archil liquor of commerce. The dye is also met with as a violet paste, and when dissolved in alcohol is used to color spirit thermometers. In consequence of its want of permanence, archil is rarely employed with any other view than to modify, heighten, and give lustre to other colors.—Some confusion exists in reference to the trade names of the different dyes prepared from lichens, but the best authorities confine the use of the word archil to the liquid or pasty dye obtained from the *rocella* tribe. Cudbear is the equivalent of *persio*, and is chiefly made from the *lecanora tartarea*, while litmus is derived from the *rocella tinctoria*.

ARCHILOCHUS OF PAROS, one of the earliest Ionic poets, and the first who wrote in the iambic measure, flourished 714–676 B. C. His father was of noble descent; his mother was a slave. After he had acquired fame by a hymn to Ceres, he became suitor to the daughter of Lycambes, a noble of Paros, who was promised him in marriage, but her father afterward revoked the promise. The poet thereupon composed a lampoon upon the family so bitter that it is said the daughters of Lycambes committed suicide. He subsequently emigrated to Naxos, where he wrote fierce diatribes against his native land. He was no better satisfied with the country of his adoption. In a battle with the Thracians he flung away his shield; for this he endeavored to justify himself by writing a poem in which he said it was better that one should throw away his arms than lose his life. He acquired a high reputation, but his poems were so unbridled that they were prohibited in Sparta. He led a wandering life for years, his journeys extending as far as Italy. Returning to Paros, he was killed in a battle between the Parians and Naxians. The Delphian oracle, which had before his birth promised to his father an immortal son, pronounced a curse upon the man who killed him, because he had "slain the servant of the muses." Notwithstanding the license of his satires, he was ranked high by Plato, and Horace mentions him in terms of admiration. The fragments of his poems extant have been collected and edited by Jacobs, Gaisford, Bergk, and better by Liebel, *Archilochi Reliquiæ* (Leipsic, 1812).

ARCHIMANDRITE (Gr. prefix ἀρχι, and μάνδρα, fold or cloister), a superior or general abbot in the Greek church, exercising supervision over several abbeys and monasteries. In the Greek church the archimandrite is subordinate to the bishop of the diocese, having, however, some episcopal functions in the ceremonial of worship. In Sicily, some abbots of monasteries of the order of St. Basil, founded by the Greek church, are called archimandrites. Abbots of monasteries of the United Greeks, established chiefly in Russian Poland, Galicia, and Hungary, are also called archimandrites.

ARCHIMEDEAN SCREW, an apparatus used for raising water. It consists of a screw blade turned around a solid axis, similar to a winding staircase, and enclosed in a hollow cylinder. When placed in an inclined position, with the lower end in water, the latter will be caught between the screw blades, and the cylinder being turned in the proper direction, the water will be raised and discharged at the upper end. Our first figure represents such an apparatus, with one half of the enclosing cylinder removed, so as to expose the interior arrangement and form of the screw blade. It is still occasionally used, when water is to be raised to a limited height of 10 to 15 feet or less, and the quantity is so large that a dozen pumps would be required; in this case an Archimedean screw turned by two or three men will economize greatly the labor, as with it each man is able to raise per minute 40 gallons of water 10 feet high, or in general to produce the labor of nearly 4,000 foot pounds per minute. This is a larger amount of work than generally can be done with pumps, in which the friction is always considerable when compared with that of the pivots on which the Archimedean screw turns. If water is to be raised to great heights, however, say 90 or 100 feet, this apparatus is not practicable, and pumps are requisite.—Another form of this apparatus is represented in our second figure. It consists of a tube wound spirally around a core, and operates on the same principle as the former; but it has a much smaller capacity, and is therefore seldom used on a large scale for practical purposes.

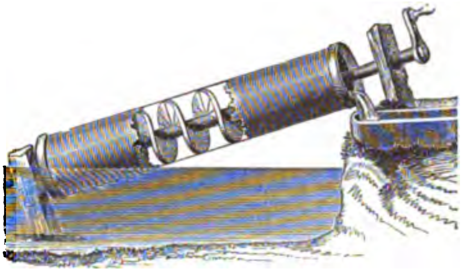


FIG. 1.—Archimedean Screw with Spiral Blade.

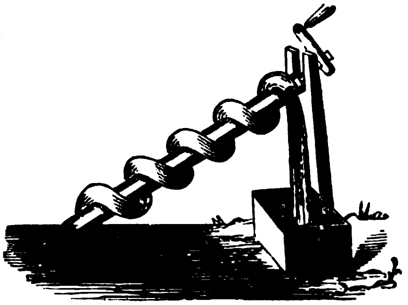


FIG. 2.—Tubular Archimedean Screw.

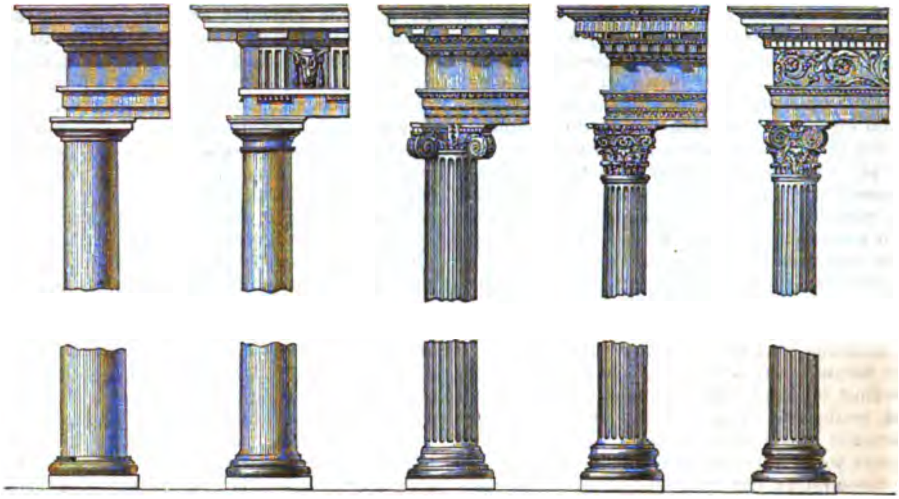
ARCHIMEDES, the most celebrated mechanician of antiquity, born in Syracuse, Sicily, about 287 B. C., died in 212. He is said to have visited Egypt in early life, and to have invented there several useful hydraulic machines, including the Archimedean screw, which he applied to drainage and irrigation. Vitruvius says that King Hiero, suspecting that a golden crown had been fraudulently alloyed with silver, asked Archimedes to discover if it were so. Going one day into the bath tub, it chanced to be full of water, and he instantly saw that as much water must run over the edge of the tub as was equal to the bulk of his body. Perceiving that this gave him a mode of determining the bulk and specific gravity of the crown, he leaped out of the bath and ran home, crying *Eureka*, *eureka*, "I have found it, I have found it." This was the origin of his discovery of the important principle that a body plunged in a fluid loses as much of its weight as is equal to the weight of an equal volume of the fluid. In his old age he defended his native Syracuse against the Romans under Marcellus with great mechanical skill, and later historians say that he burned the Roman ships by concentrating upon them the sun's rays from numerous mirrors. His purely mathematical works still extant demonstrate him to have far excelled all those who preceded him. The most celebrated are those on the ratio of the sphere and cylinder, on the ratio of the circumference to a diameter, on spiral lines, and on the parabola. He requested a cylinder and sphere to be placed upon his tombstone, and when Marcellus had stormed Syracuse, and Archimedes had been killed by a Roman soldier, the Roman general conferred upon him an honorable burial, and caused the tombstone to be inscribed as he had desired. Cicero, about 140 years afterward, being appointed quæstor over Sicily, sought and found the tomb of Archimedes, overgrown with weeds and thorns.

ARCHIPELAGO (Gr. prefix *ἀρχι*, main, and *πέλαγος*, sea), originally a specific name applied to the Ægean sea, but now a generic term designating any body of water containing a great number of islands, and applied also to the group of islands itself. I. The Grecian archipelago (the Ægean, in the wider sense of the word) is an arm of the Mediterranean sea, extending northward upward of 400 m., with an average breadth of about 200 m. Its geographical position is between lat. 35° and 41° N., and lon. 23° and 28° E. Turkey in Europe forms its northern and northwestern coasts, Asia Minor its eastern, and Greece its western, while its southern limit is marked by the island of Candia or Crete. Within these limits the Ægean forms an extremely irregular outline, having numerous armlets and indentations, among which may be mentioned the gulfs of Nauplia (or of Argolis), Ægina (the Saronic), Volo (the Pagasean), and Salonica (the Thermaic), all on the west. It is studded with a vast number of islands, ranging in size from mere rocky islets to areas of 4,000 sq. m. (Candia), and mostly composed of calcareous masses, forming high bluffs or mountain clusters, rising abruptly from the sea. Many of the mountains reach a height of 2,000 feet, while the highest summit, on Negropont or Eubœa, exceeds 5,000 feet. The Ægean islands, exclusive of Eubœa, the largest of all, are divided into three groups, viz.: the northeastern, including the islands of Thasos, Samothrace, Imbros, Lemnos, Tenedos, and Lesbos; the Cyclades, forming a kind of insular continuation of Eubœa and Hellas proper (see CYCLADES); and the Sporades N., E., and W. of the preceding (see SPORADES). Most of the Cyclades and the northern and western Sporades belong to the Greek kingdom, while Turkey possesses the northeastern group and the eastern Sporades. Many of the islands are picturesque in scenery, and all the arable portions are extremely fertile. The principal productions are silk, cotton, honey, wine, figs, raisins, oranges, and other fruits. Coral and sponge are found among the Sporades, while the Cyclades furnish the pure white marble known as the Parian, from Paros, one of the group, where it was first worked. Here also was found (about 1627) the Parian chronicle, in the Arundel collection, so full of historical interest. In the channel of Negropont (the Euripus) the tide frequently runs in a given direction at the rate of 6 to 8 m. an hour, and then suddenly, without any known cause, sets in the opposite direction at nearly the same rate. The climate of the islands is salubrious, the inhabitants are hardy, and the women noted for beauty. The localities of the Ægean are filled with classic and sacred associations. II. The second in importance is the Indian archipelago, which includes that extensive insular region of the eastern hemisphere, extending from the S. E. coast of Asia to Australia, embracing the Philippine group, Sumatra, Java, Borneo, Celebes, and the Molucca and Banda isles, and stretching between lat. 11° S. and 20° N., and lon. 95° and 135° E. This immense area is bounded by the Chinese sea, the Pacific, Australia, and the Indian ocean. The population of the archipelago consists of two distinct races, the Malay and the negro.

ARCHITECTURE (Lat. *architectura*, from Gr. *ἀρχιτέκτων*, a master workman), the art of building. This term embraces every kind of structure except works of defence and ships. The styles of architecture, like other historical monuments, may be divided into two classes, the first comprising the barbarous art of those nations which lie outside the circle of civilization, and the second comprising the historical styles, beginning with the Egyptian, Assyrian, and Greek, and reaching to our own day. The Assyrian and Greek give evidence of having arisen from a system of wooden construction; in the Egyptian the primitive material seems to have been mud or unburnt bricks. In the subsequent use of stone the forms proper to the original materials became as it were fossilized, and continued in use long after their origin and meaning were forgotten. Of the early achievements and of the progressive steps of the science of architecture there remain but fragments, though sufficient, with the assistance of history, to teach us their antiquity. Throughout the globe we find remains of edifices which proclaim an early possession of certain degrees of architectural knowledge. The most remarkable vestiges of these primitive structures, save the Celtic monuments, were once supposed to be the works of giants or Cyclops like those mentioned in the Odyssey. By whom they were erected, however, is unknown, though they have been attributed to the Pelasgians. The walls of the cities and of the sacred enclosures and tombs were composed of blocks of stone of a polygonal form well adjusted. No cement was used, the interstices being filled with small stones. At times they present horizontal layers whose upright joints are variously inclined. Their entrance gates received different forms, the most common being quadrangular, composed of upright jambs, either perpendicular or inclined, supporting a lintel. Others assume the shape of a pointed arch, the jambs gathering to a point at the summit. Examples also present themselves of truncated pointed archways over the lintel, an arch occasionally being constructed to relieve this member of the superincumbent weight. We are led to suppose that within their city walls the habitations were erected without order, a place being reserved in the midst for public assemblies. Little is known of their domestic architecture, as there exist no vestiges of those palaces so highly spoken of by the ancient poets. Perhaps the most interesting of their structures are their circular subterranean chambers styled treasuries; they present vaulted ceilings, although not constructed on the principle of the arch, the vaulted form being obtained by horizontal annular layers, corbelling inward, and the projecting edges of the stones being taken off after the construction was completed. According to Blouet, they served for tombs as well as for treasuries. Internally they were covered with sheets of bronze. At Mycenæ and Tiryns several examples are to be found.—One of the most ancient nations known to us who made any considerable progress in the arts of design is the Babylonian. Their most celebrated monuments were the temple of Belus, the Kasr, the hanging gardens, and the wonderful canals Nahar Malca and Pallacopas. From the dimensions of their ruins can be formed an idea of the colossal size of the structures they composed. The material employed in cementing the burned or sun-dried bricks, upon which hieroglyphics are still to be traced, was the mortar produced by nature from the fountains of naphtha and bitumen at the river Is, near Babylon.—No entire architectural monument has come down to us from Nineveh, the superb capital of the Assyrians; nor from the Phœnicians, whose cities, Tyre, Sidon, and others, were adorned with equal magnificence; nor from the Hebrews, the Syrians, the Philistines, and many other nations. Our want of knowledge concerning the architecture of these oriental nations is attributable partly to the devastations of war and partly to the perishability of the materials that were employed, such as gypsum, alabaster, wood, terra cotta, and brick, with which their ruins abound. From recent discoveries, we have been able to see the great affinity existing between many of the works of these nations and those of Egypt and Greece; in their sculptures and ornaments, for example, and in the coloring of the various parts of their structures, which were without doubt polychromatic.—Of the very ancient Chinese monuments we have no trace, they having been destroyed by Tsin-Chi-Hoang-Ti upon his ascending the throne. Their pagodas are merely imitations of the design of the nomadic tent. The Chinese wall is one of the most stupendous structures of the world. Japan, Siam, and the islands of the Indian ocean abound in ancient ruins once sacred to the divinities of the Buddhist faith. The Hindoos, in their colossal structures, with their endless sculptured panels, their huge figures, and their astounding intricate excavations, evince a perseverance and industry equalled only by the Egyptians. The Hindoo structures are remarkable for their severe and grotesque appearance.—The history of the art in other regions and in its later developments may be most conveniently treated under several divisions. I. **Egyptian Architecture.** The architectural types of all other structures of antiquity sink into insignificance when compared with those of Egypt. The obelisks, pyramids, temples, palaces, tombs, and other structures with which that country abounds, are on a colossal scale, and such as can have been executed only by a people far advanced in architectural art, and profoundly versed in the science of mechanics. These works, like the Hindoo structures, were remarkable for their gigantic proportions and massiveness. Intricate and highly painted rilievo sculptures or hieroglyphics covered the entire extent of their walls. The earliest works of the Egyptians are their hypogea or spea, wherein their dead were interred, and which served also as subterranean temples. In these excavations, or caves in the flanks of mountains, square piers were reserved in order to support the superincumbent weight. They were covered internally with hieroglyphics and bass-reliefs, enriched with color. Subsequently temples were constructed in the open air. At Amada exists perhaps the most ancient example of these temples. It is peculiarly interesting to archæologists, as it forms the connecting link between the superb edifices of the Pharaohs and their prototype, the spea. It also furnishes us with the proto-Doric order, combining square pillars with cylindrical columns. The plan of the temples constructed by the Egyptians is very similar to that of their hypogea, or caves. They were generally approached by an avenue, on either side of which was a row of sphinxes, leading to the propylon or gateway, before which stood the obelisks, thus forming an entrance into an open quadrilateral court surrounded by porticos. Opposite this entrance was another leading into a spacious hall, whose ceiling was supported by columns. In the rear of this principal hall were one or more smaller ones. The walls, ceilings, and columns were decorated with figures in bass-relief and hieroglyphics richly colored. The colors most generally employed were yellow, red, green, and blue. The palaces were constructed upon a plan very similar to that of the temples. We know little concerning the habitations of the great mass of the nation. According to some, houses were constructed in stories, while others assume that their abodes were mere huts. This people devoted their lives and money to the construction of their tombs. Besides their wonderful cities of the dead, hewn in rocks or imbedded in hills, the Egyptians reared their stupendous pyramids, the most gigantic monuments existing. Their ground plan is perfectly square, the sides presenting nearly equilateral triangles. From the immensity of these constructions, some have suggested the probability of the existence of a natural rock or hill within. Whether or not the outer surface was smooth or graduated with steps, when finished, it is impossible for us to decide. The constructions of the Egyptians are in granite, breccia, sandstone, and brick, which different materials are adjusted with much precision. We cannot but wonder at their monolithic obelisks, especially when we reflect upon the immense distances they were transported. The pyramidal shape pervades most of their works, the walls of their temples inclining inward. The jambs to their entrance gates also were generally inclined. The Egyptians never used columns peripterally even under the dominion of the Greeks and Romans; when the column was used externally, the space intervening was walled up to a certain height. To these circumstances, together with the fact that their monuments were terraced, can be ascribed their massive and solid appearance. With them, columns were employed to form porticos in their interior courts, and also to support the ceilings. The shafts, of different forms, being conical, or cylindrical, or bulging out at the base, sometimes presented a smooth surface; they were rarely fluted, being generally covered with hieroglyphics. Occasionally they were monoliths, but were generally constructed in layers, and covered with hieroglyphics; a circular plinth formed the base. The capitals resemble the lotus, either spreading out at the top or bound together, assuming the bulbous shape; above is a square tablet forming the abacus. Others, of a later date, present projecting convex lobes; while other capitals are composed of a rectangular block with a head carved on either side, surmounted by a die also carved. Caryatic figures were also employed by the Egyptians, and were generally placed against walls or pillars, thus appearing to support the entablature, composed of a simple architrave and a coved cornice, with a large torus intervening, which descends the angles of the walls. II. GRECIAN ARCHITECTURE. The Pelasgians appear to have been the first people settled in Greece numerous remains of whose structures are still extant. Subsequently, from the knowledge possessed by the indigenous tribes, together with that acquired from the Egyptians and the Asiatic nations, the Greeks extracted and developed a style peculiarly their own, and architectural art passed from the gigantic to the elegant and classic forms. Under the government of Pericles it flourished with meridian splendor, and some of the most superb edifices the world has ever seen were erected during this period. The Grecian monuments belonged to the states, and upon the public works the governments lavished fabulous sums. Heeren informs us that the Greeks placed the necessary appropriation of funds for the public works at the head of the government expenditures. The thoughts of the whole Greek nation, it would seem, were turned toward the adornment of their cities. They forbade by law any architectural display on private residences, and in fact, until after Greece became subject to Macedonia, architects were permitted to work only for the government. The Greeks loved recreation, and the government, as a political necessity, provided the populace with amusements. Hence the Grecian cities were adorned with temples, theatres, odeons, gymnasiums, choragic monuments, and the like.—The Grecian temple consisted of a pronaos or vestibule, and a naos or cella. These sometimes were accompanied by an opisthodomus, supposed to be the treasury, together with a rear portico, or posticum. According

Ruins of the Temple of Quorneth at Thebes.

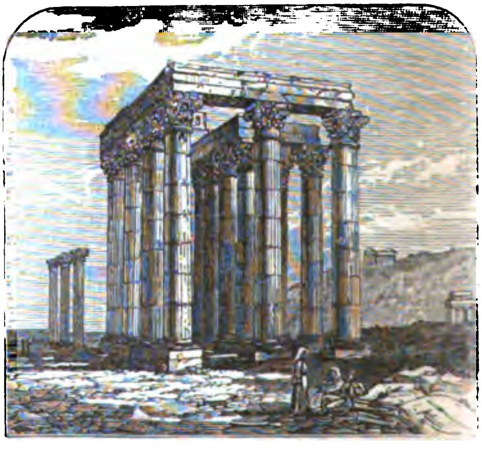
to the disposition of the columnar decoration, they were styled in antis, prostyle, amphiprostyle, peripteral, dipteral, pseudo-peripteral, or pseudo-dipteral. The principal front of those in antis presents columns in the middle, with antæ on either side, supporting the pediment; in the prostyle, the antæ are replaced by columns; the amphiprostyle presents a similar disposition in the rear as well as the front; the peripteral presents columns forming a portico around the cella; when the lateral colums were engaged, instead of isolated, the temple was styled pseudo-peripteral; the dipteral offered a double colonnade around the cella; in the pseudo-dipteral, one of the ranks of columns was engaged in the wall. They are termed tetrastyle, hexastyle, octastyle, according to the number of columns supporting the pediment. The temples were generally covered; those erected in honor of superior deities were hypetheral, or open to the skies. In these latter, the cella was divided longitudinally into three naves by a double row of colums, which supported the roof covering the side aisles. In order to save room, these rows of columns were in two stories, as thereby they were enabled to attain the desired height with columns of a less diameter. The ceilings of the porticos were subdivided in caissons, oftentimes highly colored, as were likewise many parts of the edifices. The frieze below the ceiling, on the exterior of the cella walls, was often ornamented with bass-reliefs. The walls internally were decorated with paintings, though it is supposed that generally these latter were not executed directly on the walls, but were suspended against them. The pavement of the cella was usually elevated above that of the portico; that of the Parthenon, however, is level throughout. Opposite the entrance door was placed the statue of the deity of the temple, which was often of colossal size, while others were arranged on either side of the cella, or about the principal deity. They were generally in marble or bronze; sometimes, however, they were of ivory and gold. Besides the different statues of their divinities, the cellas contained altars, tripods, thrones, arms, vases, and utensils of different sorts; all of which objects were generally in precious materials, highly wrought. The more important temples were built on sacred ground; within the peribolus or enclosure were sacred groves, grottoes, altars, columns, statues, &c. The entranceway or propylæum, somewhat similar in plan to the pronaos of their temples, was grand and imposing. Little is known of the theatres and odeons, the graded hemicycles of the former, destined for the spectators, being all that now remains of them. These hemicycles were excavated in the side of a hill. Of the choragic monuments, that of Lysicrates at Athens is the finest example; upon a quadrangular basement was placed a cylindrical monument with engaged Corinthian columns supporting an entablature surmounted by a dome crowned with a beautiful acroteral motive, upon which is supposed to have been placed a tripod. The Grecian agoras, or public places of assembly, were surrounded by porticos decorated with paintings commemorative of glorious achievements. Within the enclosure were temples, altars, and statues dedicated to their heroes. We know little of the architectural arrangement of the gymnasiums, which contained the halls, porticos, and exedras, where the sages taught their different philosophies; or their baths, accompanied by their dependencies, about which were disposed the stadium and courts for various gymnastic exercises. It is likewise difficult to obtain any accurate idea of the architectural disposition of the domestic habitations, as no examples remain. The beauty and grace which pervade all the works of the Greeks, whether monumental, mechanical, or industrial, lead us to suppose that, although imperfect as regards comfort, they must yet have exhibited a certain degree of elegance. A just idea of the mouldings and ornaments, unequalled for their purity and grace, can be obtained only from personal observation. The styles may be classed in systems or orders as the Doric, Ionic, and Corinthian. They also employed, though rarely, caryatides. Innumerable conjectures exist concerning the origin of these different orders. In all probability we are indebted to the Dorians for the invention of the Doric; although Champollion sees in an Egyptian order, which he styles the proto-Doric, the type of the Grecian order of that name. The oldest example extant is at Corinth. To the Ionians, likewise, is attributed the honor of having first employed the Ionic order, no example of which is to be found in Greece prior to the Macedonian conquest. Vitruvius accords to Callimachus the invention of the Corinthian capital, but foliated capitals of much greater antiquity than any discovered in Greece are to be found in Egypt and in Asia Minor. The most perfect Grecian example of this order is employed in the choragic monument of Lysicrates. Little doubt need be entertained as to the Greeks deriving the idea of their caryatic order from the Egyptians, who often employed human figures instead of columns in their structures.—The Doric holds the foremost rank among the Grecian orders, not only on account of its being the most ancient, the most generally employed, and consequently the most perfected, but more especially because of its containing, as it were, the principle of all their architecture, as well as an exact imitation of all the parts employed in their primitive constructions, which were undoubtedly of wood. Thus we see the post represented by the column, the wall plate by the architrave, the extremities of the joists by the triglyphs; the rafters naturally produce the projection which composes the cornice; while the double pitch of the roof gives us necessarily the form of the pediment. This style, typical of majesty and imposing grandeur, was



Tuscan. Doric. Ionic. Corinthian. Composite.

almost universally employed by the Greeks in the construction of their temples; and certainly monumental art does not furnish us with the equal of a Greek peripteral temple. The Grecian Doric may be divided into three parts: the stylobate, the column, and the entablature. The stylobate is formed by three receding courses, together about equal in height to the inferior diameter of the column, which dimension is generally used as a measure of proportion in describing the orders. On the uppermost course stands the column, from four to six diameters in height, and whose diameter at top is about three fourths of that at base; the shaft, thus assuming a conical shape (which diminution, in a slightly curved line, is styled entasis), generally bears 20 shallow flutes, their sections forming segments of circles, or similar curves which meet and form a sharp anis. At the base these flutes detail on the pavement; they pass through the hypotrachelium, or necking, and terminate beneath the annulets of the capital, either in a straight or curved line. Upon the shaft is placed the capital, nearly one half of a diameter in height, composed of an abacus, or square tablet, about $1\frac{1}{3}$ diameter in width and one fifth in height. This member is supported by the echinus, of about the same height when there is a necking, but occupying a greater proportion when none exists. This echinus or ovolo bears three, four, or five rings at the bottom, where it dies away in the shaft. The axes of the columns were slightly inclined. According to Villeroi, in a rectangular temple, planes passing through the centres of the columns would meet in a straight line; in a point, if the plan of the temple were square; the columns at the angles following in both cases the direction of diagonal lines. This inclination does not commence until the second course, or about one tenth of the height of the column, if monolithic. The first course being an oblique truncated cone, determines the angle of inclination; the remaining courses forming the column are upright truncated cones, perfectly adjusted one to the other. The inclination of each column is proportional to the distance, to the line joining the foci if the monument be rectangular, or to the centre of the plan of the edifice if square. Thus the columns at the angles are the most inclined, those in the middle of the sides the least. The entablature, about two diameters in height, is subdivided into three parts: the architrave, the frieze, and the cornice. The architrave occupies about two fifths of the whole height, being perfectly simple, crowned by the tænia or continuous fillet, one tenth or one twelfth of its entire height; below this fillet, under the triglyphs, there is a regula, of less height, from which depend six cylindrical drops. The face of the architrave is generally in a vertical plane tangent to the base of the columns. The frieze, of about the same height as the architrave, is terminated on top by a projecting fascia, occupying about one seventh part of its whole height, which breaks around the triglyphs, where it is slightly increased in depth. Horizontally, the frieze is subdivided into triglyphs and metopes, which regulate the intercolumniation in the following manner: A triglyph about one half a diameter in width is placed exactly over the middle of each column, and one in the intervening space. They are separated by the metopes, which in width are equal to the entire height of the frieze. This distribution differs, however, at the angles; here the outer edge of the triglyph is in the same perpendicular line with the circumference of the base. Thus the first intercolumniation, counting from the angles, is contracted. The Greeks also gave a greater diameter to the columns at the angles. The triglyph is subdivided into two glyphs, each one fifth of the whole width (a triangular fluting or channel formed by the intersection of two vertical planes inclined inward from the face of the tablet), of two semiglyphs, and two interglyphs, each one seventh of the entire width. The glyphs detail on tænia. Above they are sometimes square-headed, sometimes curved; the semiglyphs finish with a curve at the top. The surface of the interglyphs is in the same plane with the architrave. The metopes recede from the triglyphs, and were oftentimes decorated with sculpture. The cornice, projecting about its own height, is composed of a corona, about one half of the whole height, crowned by a square fillet supported by a congeries of mouldings, together about one half of the height of the corona, which latter has on the lower edge a sunken face bearing the mutules and guttæ, which form the soffit or plancher of the cornice, inclined up inward at an angle of about 30°. The mutules are placed directly over the triglyphs and metopes, and are exactly equal to the former in width; they are ornamented with three rows of cylindrical drops. The height of the pediment is generally about 1⅓ diameter. The cornice crowning the inclined sides of the tympanum differs from the horizontal one at its base, inasmuch as the mutules are left out, and another member superimposed, which is either an ovolo with a fillet, or a cymatium, occupying a space equal to about one half of the depth of the cornice with its mutules. The tympanum was often decorated with sculpture. The flank cornice supported antefixæ, an ornament used to cover the ends of the joint tiles of the roof. The antæ or pilasters, nearly equal in diameter to the columns, did not diminish at the top, nor were they fluted like the columns; they generally had a congeries of mouldings at the top and the bottom. The Greeks never employed peripterally any other than the Doric order.—The Ionic, remarkable for its grace and suavity of proportions, holds a middle place between the simple Doric and the rich Corinthian order. According to some, it was originally employed in funereal edifices. At Telmessus, in Lycia, are to be found tombs cut in the rock, which invariably offer examples of this style; moreover, on the Grecian vases the representation of the Ionic column is symbolical of a sepulchral monument. This order, as well as the Corinthian, is more tractable than the Doric. Like the latter, it is composed of stylobate, column, and entablature. The column has a base as well as a capital, and is about nine diameters in height. The base, about one half a diameter in height and 1⅓ in width, is composed of a torus resting on the stylobate, a scotia, and a second torus, all about equal, and separated from each other by a fillet, one also finishing the apophyge, or escape of the shaft, which diminishes with entasis about one sixth of a diameter, bearing 24 flutes deeper than in the Doric column, and which are separated from each other by fillets. These flutes finish in the same curve above and below. The capital is about one half of a diameter in height, when unaccompanied by a necking; when one exists, it is about three quarters high. The volutes, carved on the faces of a parallelogrammic block, and connected at the sides by bolsters and in front by flowing lines, are supported by a congeries of mouldings, composed of a bead and ovolo. Superimposed is the abacus. These volutes are a full half diameter in depth, and extend in width about 1⅓ diameter. When this capital is accompanied by a necking, a torus is introduced in corbel mouldings, supporting the volutes, and the necking itself, ornamented with the honeysuckle and tendrils, is separated from the shaft by a fillet or a bead. The outer volute of the capital at the corners is inclined at an angle of 45°, so as to present a volute when viewed from either side; internally the two volutes meet at right angles. The entablature, a little over two diameters in height, is composed of architrave, frieze, and cornice. The former, occupying about two fifths of the whole height, contains three equal fascias, slightly projecting one beyond the other, the lowest one being in a plane tangent to the inferior circumference of the column. On the upper edge of the architrave are a few corbelling mouldings, comprising a little less than one quarter of its whole height. The frieze is of the same height with the architrave, recedes slightly, and is either plain or ornamented with sculpture. The projection of the cornice is about equal to its height. It is composed of bed mouldings undercutting the corona; this latter is of great breadth, and the crown mouldings are of much less importance than in the Doric. The pediment of this order is also rather lower, and its cornice is crowned by a rectangular fillet surmounting small mouldings. The intercolumniations differ from two to three diameters. —The only example of the Grecian Corinthian is to be found in the choragic monument of Lysicrates, which is a small circular structure decorated with engaged Corinthian columns, placed upon a high rectangular basement. This order is composed of a stylobate, a column, and entablature, the first occupying in height a little more than one diameter. The column is about 10 diameters high, has a base somewhat similar to the Ionic, between one third and one half of a diameter in height, and in width rather more than 1⅓ diameter. The shaft, whose top diameter is about five sixths of that at the base, bears 24 flutes nearly semicircular, terminating at the bottom in the same curve, and at the top in leaves, the fillets forming stalks. The capital, separated from the shaft by a groove, is a little more than 1⅛ diameter in height. Its cylindrical body is surrounded at the bottom by a row of water leaves occupying about one sixth of the entire height. Above them is placed a row of acanthus leaves twice as high as the former, seemingly buttoned on. Between this second row and the abacus are helices and tendrils, the latter supporting honeysuckles in the middle of the abacus, which member is about one seventh of a diameter in height, and in plan presents a square with concave sides whose angles are cut off at 45°; its section presenting a fillet, on which reposes a cavetto and an ovolo separated by another fillet. The entablature is about 2½ diameters in height, of which the architrave and cornice occupy separately rather more than one third, and the frieze rather less. The architrave is divided into three equal fascias, inclined inwardly sufficient to bring the outer edges in the same plane with the inferior diameter of the column; these fascias together are crowned by corbelling mouldings, being one sixth of the entire height. The frieze is slightly inclined also and is sculptured. The projection of the cornice is about equal to its height. The bed mouldings have about two fifths of this projection, and occupy five eighths of the entire height of the cornice, undercutting the soffit. Their principal feature is a dentilled member, more than one quarter of the whole cornice in height. The height of the corona is only three eighths of the cornice, and nearly one third of this is taken up by the crowning ovolo and fillet. In this example the cornice is surmounted by a cut fascia supporting antefixæ, somewhat similar to those employed on the flanks of Doric and Ionic temples. The intercolumniation is 2½ diameters. In the example offered us at the Acropolis of Athens the caryatides stand on a stereobatic dado, placed on the stylobate; the antæ bear the mouldings of the temple to which they are attached, forming base mouldings to the dado, which has also a cornice. The entire height of the stereobate is about three fourths of that of the figures, taken together with their base and capital; the former is a square tablet or plinth, the latter a circular moulded block crowned by an abacus. The entablature is about two fifths of the height of the figures, and is nearly equally divided between architrave and cornice. The upper of the three fascias of the architrave is ornamented with circular disks. The cornice is composed as usual of bed mouldings, corona, and crown mouldings, the former with dentilled member forming about two fifths of the whole height. The researches of Mr. Penrose have proved that all the horizontal lines of the Greek temples were curved, and that most of the plane faces inclined either out or in. These refinements were evidently intended in part to counteract certain obvious ocular illusions, but some of them are difficult to account for. Similar refinements are found in mediæval and modern work. III. Etruscan Architecture. The polygonal formations observed in the walls of Etruria belong to the Pelasgic civilization, and are similar to those of Greece and of Asia Minor. The commercial relations existing between the Etruscans and the Hellenes of Greece and Magna Græcia account for the existing similitudes in their artistic productions. The ceilings of the hypogea, hewn so as to represent caissons, tend to corroborate the idea that their earliest structures were of wood, which, with them as with the Greeks, became the archetype of their structures in stone. To the Etruscans the invention of the arch, constructed on its true principles, has been generally attributed, as likewise the composition of an order styled Tuscan, a species of simple Doric, no entire example of which, however, has been bequeathed to us by the ancients. IV. Roman Architecture. The history of Roman architecture under its kings and at the beginning of the republic is somewhat obscure, as but few of the monuments of that period remain. The Roman kings fortified the city, and erected various palaces, temples, and tombs. It gradually became adorned with colossal works of art, whose grand features, forming such a contrast with the comparative insignificance of its power and condition, would seem to indicate that the future of imperial Rome had been foreshadowed to its people. The early Romans employed Etruscans in their works. After conquering Greece, Rome became enriched with the spoils of Athens and Corinth. The Greek artists sought protection and patronage among their conquerors, and adorned the imperial capital with structures which called forth unbounded praise. The Grecian style was blended with the Etruscan during the more early period of the Roman school. But as the arch, which was the characteristic feature of Roman architecture, revealed its treasures, the Grecian elements were employed only as a system of ornamentation. Thus, oftentimes, the column no longer served as a support, but was merely used to decorate the pier or wall from which the arch sprang. Great discussions have arisen as to who were the inventors of the arch. In Etruria are found many monuments wherein its design exists, and which are of an anterior date to the construction of the *cloaca maxima* (wherein it is fully developed), and even to the foundations of Rome. It is probable that the Romans borrowed it from the Etruscans, who may have followed eastern examples, but that it owed its useful application to Rome. With its introduction came various important modifications in architecture. Arches were substituted for lintels. With the assistance of the arch great spaces could be covered, and the various combinations of vaulted ceilings naturally ensued.—The early Roman structures were of stone. Subsequently the mass of the constructions was of brick, externally decorated with slabs of marble, and similarly decorated internally, together with stucco work. Bricks seem to have been used by the Romans, partly in consequence of the facility offered by this material for the construction of the arch, and partly because they had but little marble. Stone, terra cotta, bricks, and marble were ingeniously put together in various ways. The edifices of the Romans display a taste for the luxurious and magnificent rather than for the harmonious and beautiful. Their exterior pavements were variously composed of stone, tiles, marble, porphyry, and other durable materials, laid in cement. Internally their floors were similarly laid in mosaic work. This style of work is supposed to have originated among the eastern nations, subsequently being employed by the Egyptians and Greeks. The walls of the Romans were stuccoed and decorated with paintings in the arabesque style, or covered with various marble, alabaster, and jaspers, while their columns also were of granite, marble, and porphyry. This luxury strikes us the more forcibly, as these apartments, so richly adorned and containing various *chefs d'œuvre* of art, were but very imperfectly lighted; in fact, they were sometimes wholly dependent upon lamps. This, too, is one of the great defects in their dwellings, as can be clearly seen at Pompeii. Their houses generally presented an entrance on the street, accompanied by shops if in a principal thoroughfare, leading into an atrium or court, with a compluvium in the middle and porticos on the sides connecting with the rooms occupied by the servants. This court connected with another in the rear, also surrounded by a portico, which led to the apartments of the master. But nowhere is this taste for richness rather than simplicity more evident than in comparing the details and mouldings of the Greeks and Romans. It is due the latter, however, to make an exception in favor of their Corinthian order, which they employed as universally as did the Greeks the Doric, and to their structures must we turn for many of the finest types of this order. The column, varying in height from 9½ to 10 diameters, is composed of base, shaft, and capital. The base, about one half diameter in height, in some cases consists of two tori and a scotia, with intervening fillets, placed upon a plinth, as in the examples of the temples of Antoninus and Faustina and of Vesta; in the temples of Jupiter Tonans, of Castor and Pollux, and in the portico of the Pantheon, there exists a double scotia. The shaft diminishes with entasis about one eighth of a diameter, and is generally fluted when the material permitted. These flutes were semicircular, separated by fillets one quarter of their width, and 24 in number. At the upper extremity, the fillet above the cavetto supports a small torus, on which rests the capital, about 1⅛ diameter in height, composed of two rows of eight acanthus or olive leaves. The lower row, about one third taller than the upper one, occupies about one quarter of the whole height of the capital. The leaves of both finish on the hypotrachelium. Above are helices and tendrils trained with foliage, surmounted by an abacus, composed of a cavetto, fillet, and ovolo, forming together one seventh of the entire height, and which in plan presents a square with the corners cut off; the sides being concave segments of circles, in the middle of each of which is placed a flower or rosette. The entablature is about one fifth of the column in height, three fifths of it being occupied by the architrave, together with the frieze, the former divided into three unequal fascias, generally separated by a bead and a cyma reversa, and crowned by a small congeries of mouldings, the first fascia impending the shaft at top. The frieze is generally enriched with sculpture. The bed mouldings of the cornice, when decorated with modillions, occupy about three fifths of the total height; when no modillions exist, only one half is taken up by them. They generally consist of a bead, a cyma reversa, and a fillet, a vertical member dentilled or not, another bead, and an ovolo, supporting a plain vertical face, one third of bed mouldings in height, which bears the modillions, and is surmounted by a cyma reversa, which breaks around the same. The modillions are horizontal consoles, in width equal to their height, bearing large volutes at the inner end and smaller ones at the outer extremity, joined by a graceful curve, underneath which spreads an acanthus leaf; the space between them is about twice the width of the modillion itself. Resting upon the modillions is the corona, surmounted by a small congeries of mouldings, a cymatium, and a fillet. The soffit of the corona is coffered between the modillions; in the centre of each is placed a rosace.—The composite order may be considered as a sort of Corinthian, as the principal difference exists in the capital, where the volutes occupying about one quarter of the total height rest upon a bead and ovolo; the central tendrils are also omitted, and the upper row of leaves is higher than in the ordinary Corinthian. Besides this particular composite capital, the Roman monuments furnish us with others ornamented with trophies, eagles, masks, &c. The pediments of the Roman edifices were steeper than those of the Grecian; the cymatium was continued along the flank cornices, thereby doing away with the antefixæ.—The Doric order, on account of its simplicity, was very rarely employed by the Romans. In the few examples which have been preserved, the proportions are more slender, the projections less hardy than in the Grecian Doric; and, in endeavoring to give it more elegance, this order lost with the Romans its simplicity and grandeur. At Albano an example has been discovered where most of the mouldings are ornamented. The baths of Diocletian furnish us with still another example greatly enriched. The necking is ornamented with small rosaces, the echinus is sculptured with leaves, the metopes and corona are also enriched with sculpture, while the cornice resembles that generally employed in the Ionic order. The best examples of this order bequeathed to us by the Romans decorate the temple of Hercules at Cori, and the theatre of Marcellus at Rome. The former, however, is almost wholly Greek. In the latter example, the column, composed of shaft and capital, is about eight diameters in height. The capital, occupying about one half of a diameter in height, may be divided into three nearly equal parts. The uppermost, given to the abacus, of less projection than in the Grecian examples, is crowned by a cyma reversa and fillet; the ovolo supporting the abacus is a semi-torus resting on three fillets, and occupies the middle division; while the lower third is taken up by a necking which is separated from the shaft by a small torus and fillet. The shaft, less conoidal than in the Grecian examples, is without flutes, the superior diameter being about four fifths of the diameter at the base. The total height of the entablature is about one quarter of that of the column; its projection is about equal to its height. The architrave is one half of a diameter in height; the frieze 1½ diameter. The principal difference in the distribution of the Grecian and Roman Doric frieze is in the position of the triglyph over the column at the angle. The Romans preserved the same intercolumniation throughout, and placed the triglyph directly over the column, thus forming half metopes at the angles. In the cornice the bed mouldings occupy more height than in the Grecian types, and are composed generally of a cyma reversa, dentil, and ovolo, separated by fillets. The corona is of less importance, it being sacrificed to the cymatium, which in return is of more value than in the Grecian Doric. The soffit generally bears mutules, though sometimes these latter members are dispensed with. The only examples of the Ionic order in ancient Rome are to be found in the temples of Saturn and Fortuna Virilis, in the baths of Diocletian, in the Colosseum, and in the upper order of the theatre of Marcellus. The total height of the columns varies between eight and nine diameters. The base, about one half of a diameter in height, is composed of a torus resting on a plinth, a scotia, and a second torus; the three upper members have fillets intervening. The shaft, slightly increased in diameter at one third of its height, is either plain or fluted; in the latter case the flutes, separated by fillets, are semicircular, and are 20 in number. The diminution of the shaft varies between one eighth and one tenth of a diameter. The capitals, occupying about one half of a diameter, vary; those of the theatre of Marcellus and of the temple of Fortuna Virilis are without a necking. The volutes, connected by horizontal instead of curved lines, are bolstered, and the abacus crowning the volutes is composed of a cyma reversa and a fillet. In the Ionic capitals of San Lorenzo at Rome (generally thought formerly to have belonged to the temple of Jupiter and Juno), there exists a necking. The temple of Saturn presents still a third species, the volutes being doubled and inclined at an angle of 45°. The height and projection of the entablature are nearly equal, varying between one quarter and one fifth of the height of the column. The architrave and frieze are equal in height, and are a little less than that occupied by the cornice. The frieze is either with or without sculpture. The bed mouldings of the cornice generally consist of a cyma reversa, a dentil course, and ovolo, separated by fillets, together occupying rather less than one half of the entire height of the cornice; the corona and crown mouldings, with the cymatium, complete this order.—The whole of the Roman possessions were covered with massive structures which embodied the Roman spirit of defiance and the supremacy of the conqueror. We find everywhere in her own limits and in her possessions roads, aqueducts, bridges, ports, forums, basilicas, temples, mausoleums, palaces, baths, theatres, amphitheatres, hippodromes, naumachias, triumphal arches, cloacas, prisons, fountains, cisterns, monumental columns, villas, grottoes, and markets. During the empire, Rome was adorned with its beautiful Pantheon, Asia was endowed with many beautiful structures, and Athens itself became embellished with the famous temple of Jupiter

Arch of Titus.

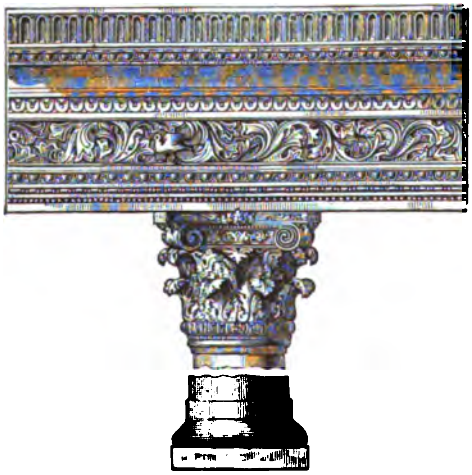


Ruins of the Temple of Jupiter Olympius at Athens.

Olympius. The baths or *thermæ* of Augustus, Nero, Titus, Caracalla, and Diocletian were renowned for a magnificence which was hardly surpassed even by their palaces. In fact, throughout all the Roman structures, from the palace of the Cæsars to the villas of Lucullus, Sallust, and Hadrian, the greatest display of splendor and luxury prevailed. But, of all their structures, perhaps the most stupendous was the Colosseum, capable of containing more than 100,000 spectators. It was partially destroyed in 1084, by Robert Guiscard the Norman, who conceived the idea that it was to be used as a citadel against him. Though from the ruins the popes have taken sufficient material to construct the Farnese palace, the Cancellaria, and St. Mark, the cragged and crumbling remains are still gigantic and imposing. V. **Architecture of the Middle Ages.** The architecture of this period, although it was derived from Greek and Roman models, applied new principles, forming structures wholly different from the antique originals. Through many successive centuries the Roman school of art continued to suffer changes. From the fragments of edifices which were torn down to form new structures, arose new combinations. The transition styles which then prevailed were, from their characteristic peculiarities, designated as the Latin, the Byzantine, the Lombard, the Saxon, the Norman, and the Romanesque, together known as the old or round-arched Gothic. During the 4th century architecture had reached its lowest point. In the religious edifices of this period marked evidences exist of an utter want of artistic feeling. The sterling principles which had been the glory of Grecian and Roman schools were either forgotten or not understood. Arches with and without archivolts were made to spring immediately from the capitals of the columns. Orders were superimposed with broken entablature; in fact, this latter member was altogether done away with in some cases. Grace was wanting in the mouldings and sculpture; the different orders were employed in the same peristyle, and the whole school of architecture became a prey to the general system of innovation which then existed. During this state of things hordes of barbarians invaded every province of the empire. This universal conflict was not calculated to give a new impetus to art, nor to promote its progress. Italy, however, under the rule of the Ostrogoths, evinced in some measure a renewed architectural zeal. Theodoric repaired the walls and drains of Rome, reorganized the *comitivæ Romanæ* (who guarded day and night the monumental structures of the capital), and by his own devotion to the arts, together with that of his daughter Amalasontha, revivified the spirit of a fast perishing craft.—After the transfer by Constantine of the imperial seat to Constantinople, the arts were again successfully cultivated by the Greeks, who made free use of the architectural treasures left by the ancients. Then appeared the dome, the glory of the Byzantine school, supported by its pendentives highly ornamented with mosaic. This principal feature of the Byzantine school induced their architects to abandon the Latin cross (which form had gradually grown out of that of the Roman basilica) in the plan of their churches, introducing instead the Grecian cross, whose branches are of equal length. The dome no longer rested on circular walls, but was borne by four arches resting on pillars placed at the four angles, in plan. Pendentives were introduced in order to sustain the circular dome, as otherwise the triangular space in the four corners would have been left without support, the diameter of the dome being equal to one of the sides of the square. In some cases the corner pillars were square, presenting an angle only at the corners, thereby giving an extraordinary degree of lightness to the structure. The semicircular arch of the Romans was often elongated, in order to attain an equal height with different spans. The dogmas of the iconoclasts obliged the architects to seek some other means than sculpture of enriching their temples; hence the profusion of mosaic work. Their ornaments represented foliage in bass-relief and interlaced lines. The capitals of the columns were square blocks similarly carved, tapering down at angles to join the circular shaft. Under Narses and Belisarius the dome was introduced into Italy. The Byzantine style, whose chief promoters were Anthemius of Tralles and Isidorus of Miletus, also became the basis of the new Persian, Russian, and Saracen schools. We find its peculiarities existing during the middle ages in Greece, Italy, Sicily, Spain, Arabia, and India. Among the chief edifices of the Byzantine school are St. Mark's at Venice, San Vitale at Ravenna, and St. Sophia at Constantinople, the last being one of the most magnificent of the eastern empire.—The Saracens and Moors introduced into Europe certain forms of architecture which, though differing in very many features from the classic styles, were still founded on the remains of the Grecian school, blended with the oriental elements of the Byzantine. The chief peculiarity of these styles was in the form given to the arch. The Saracenic arch was of greater depth than width. The Moorish style was distinguished by arches in the shape of a horseshoe or a crescent. The Saracens and Moors are, however, so completely one people, that it is with difficulty that the differences of their essential features can be discriminated. Their mural ornamentations, styled arabesque, presented more varied designs of graceful and ingenious combinations of geometrical and floral traceries than had before been known. The reproduction of animated forms was prohibited by the Koran. Another striking feature of this school is the peculiar way in which they ornamented their pendentives, by a series of little niches placed one above another, covering not only the surface of the inner projecting angles, but forming at times the superentablature of the edifice. The numerous mosques, palaces, bazaars, tombs, and other edifices of the Moslems, existing throughout various parts of Europe, Asia, and Africa, attest the great similarity existing between this style and the Byzantine; this has been attributed to the employment of Greeks on their works.

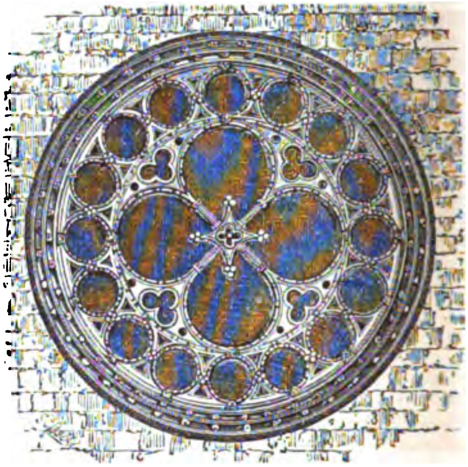
Interior of the Golden Gateway at Jerusalem.

A fact worthy of note, also, is that the Moslem structures furnish examples of the pointed arches, whence according to many they were brought into Europe.—The Lombards, having possessed themselves of the northern part of Italy after the middle of the 6th century, there founded their kingdom. Converted to Catholicism, they adopted the arts of the people they had vanquished; and, as in Lombardy there existed but few ancient temples whose materials could be employed in other structures, we find them originating a complete and systematized style, which at length pervaded all districts where the Latin church had extended its influence; the people of each country where it was introduced modifying it to suit their climate, customs, and wants.



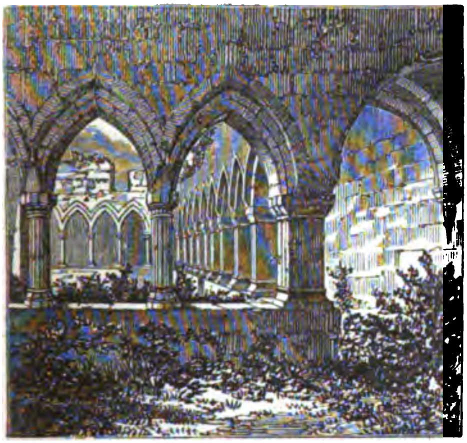
Pillar in Church of St. John, Constantinople.

Its branches are variously known as the Merovingian, Carlovingian, Saxon, Norman, &c., which together were styled old Gothic, and out of which grew the pointed style, after the introduction into Europe of the pointed arch. During this epoch plain, banded, fluted, and polygonal columns, in spiral or zigzag, were clustered, broken, or knotted together. Their capitals were foliated or had various grotesque animals sculptured on them; they were supported on brackets variously carved, or rested upon the backs of animals, which replaced the pedestal. Every license was taken with the entablature, even to the suppression of it altogether. Against the jambs of arched openings were often placed numerous columns supporting the arched mouldings.



North Transept Window, Lincoln Cathedral.

Oftentimes a greater arch encompassed several smaller ones, supported by pillars which intersected each other in various ways. Their openings were quite elongated and often coupled; the circular window, or rose, was also very frequent in their frontispieces. Semicircular, elongated, flat, horseshoe, and foiled arches are to be found, ornamented and simple, and either served as a decoration, crowned their walls, or supported horizontal bands, dividing into panels their walls, which were likewise panelled off by long pilasters or flat buttresses. The angles of their churches (generally in plan in the form of the cross) were often surmounted by a sort of pinnacle. Ribs are also found in their vaulted ceilings. Towers first accompanied the churches; later they formed a part of the same edifice, flanking or decorating the middle of the façade. The earlier examples were square; later they were round, and later still of a polygonal form. The roof, assuming a more and more pointed shape, approached the form of the spire, as it was introduced in countries where the climate was more severe. The monasteries and convents generally contained an interior court surrounded by porticos, about which were placed the cells of the inmates. The lower stories of the royal palaces and town halls presented a similar disposition. External porticos, or lodges, also existed. During this period it is supposed that the construction of houses in stories became general. The habitations of the mass of the people were poor and irregularly planted about the town hall in the cities, or clustered about the massive feudal castles. These edifices consisted of a main tower, or keep, the walls of which were from six to twelve feet thick, with windows, consisting of holes one or two feet wide, placed at irregular intervals. The several floors were constructed on arches; the roof was flat, or had battlements, and possessed a notched parapet for the purposes of defence. The main tower was surrounded by a courtyard protected by a high wall, and the arched entrance was strongly secured by a falling gate or portcullis. Around the whole was a deep ditch, or fosse, which could be filled with water. Many of the castle fortresses were on a plan of great magnitude, consisting of two or more towers and divers inner buildings, including chapels.—While the whole of Europe was convulsed with the international and social strife and invasions of barbarians which resulted in its complete reorganization, the study of the arts, sciences, and literature took refuge in the monasteries. The influence of the clergy declined, however, as free institutions arose, and the pointed Gothic must be regarded as the work rather of secular than of clerical architects. This change was doubtless made more complete by the increasing importance of the fraternity of freemasons. In Italy during the 10th century we find the corporation of *magistri comacini* exercising great influence, and giving to Grecian artists shelter from the political troubles of the East, and from the persecutions of the iconoclasts. These artists promulgated among the Lombards the Byzantine elements of design, whose influence, as we have seen, was more or less felt throughout the architectural schools of Europe. Under Erwin von Steinbach of Germany, during the 13th century, the *Hütten*, or lodges, were organized, one object of which was the study of architecture, over which they exercised a powerful influence. In Strasburg existed the *Haupt-Hütte*, or main lodge. Under Jost Dotzinger of Worms (who in 1444 succeeded the architect J. Hult), the various sects of the German freemasons were incorporated into one body, and, in virtue of an act passed at Ratisbon the same year, the architect of the cathedral of Strasburg was elected the sole grand master of the fraternity. These *magistri lapidum* were likewise sole directors or supervisors of all the religious structures. Protected by the church, architecture in their hands passed from the old Gothic through various phases of the pointed style. The spirit of the age seems embodied in the Gothic cathedral, the work of minds inspired with solemn and devotional feelings. The cathedrals in the pointed style most justly deserve admiration. The pointed style is customarily divided into three periods: the first, or primary, dating from the latter end of the 12th century; the second, or decorated, or rayonnant, from the commencement of the 14th century; and the third, or perpendicular, or flamboyant, from the end of the 14th to the 16th century. The essential element of this style is the pointed arch. Were it not for this feature, it would be often difficult to distinguish between the earlier works of the first period of the pointed and the later works of the old Gothic. It is during the first period that the spire surmounting the tower becomes of so great importance, forming one of the striking characteristics of this style. In the finer examples it is octagonal and very pointed, either plain or ribbed, sometimes pierced, sometimes crocketed, and invariably bearing a finial. Buttresses and flying buttresses also form a striking feature; these latter being somewhat massive and heavy at first, but gradually becoming more and more elegant as they approached the second period. The set-offs are formed by inclined slabs, or by a pediment with finial, the face of the buttresses being ornamented at times with panels and niches; in some cases also the space between the arches of the flying buttresses is occupied by radiating columns. The parapet is uninterrupted, and is either decorated or plain. Turrets were either square or octagonal, their pinnacles being mostly of the latter form, either crocketed or not. The rose windows of this period are quite simple: small columns radiating from the centre receiving foiled arches tangent to the circumference. The lancet arch predominates. The windows are very long and narrow, and are either simple or coupled, in



Celtic Gothic Cloister, Kilconnel Abbey, Ireland.

which latter case a slender column forms, as it were, the mullion. The ribs of the groined ceilings are decorated with bosses at their intersections, and rest either upon corbels, or upon the shafts of slender columns which descend to the pavement. The piers are either simple in plan, or present several shafts clustered around a core of a circular, elliptical, or cruciform shape. The sculpture, wherein the national flora is introduced, supersedes altogether the ornamentation previously employed; rosaces, trefoils, quatrefoils, and panelling are introduced to ornament their works in various ways. During the second period the style reached its noblest development. A greater elegance and richness pervade this period, whose characteristic features are thereby distinguished from those of the previous one. The flying buttresses are extremely graceful, those at quoins being placed diagonally. The parapets are pierced or embattled, as are also the pediments. The windows gradually assume a less pointed form, the head of the arch being in general equilateral. Replacing the small columns in the windows are moulded mullions, which form graceful flowing traceries in the head of the arch. The drip-stone is often surmounted by a canopy or pediment resting on masks, and enriched with crockets and a finial. The clustered columns composing the columnar piers are more elaborate, and generally placed diagonally. Their bases become more important, and are placed upon octagonal plinths clustered together. The ribs, bosses, and carved ornaments throughout have more relief and are more elegant. The third period is remarkable for its profuse ornamentation. The panelled walls, with their niches, tabernacles, canopies, and screens, highly decorated, the flying buttresses enriched with pinnacles and tracery, the corbelled battlements and turrets, and the balustrades intricately carved and pierced, are characteristic of this epoch. The arch presents many varieties of form. Together with those common in the preceding periods, others exist very depressed, being in many cases almost flat. The ogee, or contrasted form, also appears in the openings and pediments. The doors are generally square-headed, the spandril above being enriched with traceries. The rose windows during the 15th century are most intricate in tracery. The ground vaults also are very elaborate, while their bosses and pendents are unequalled for their wonderful carvings. The mouldings of the archivolts, more prismatic in their forms than in the previous periods, continue down uninterruptedly to the foot of the openings, thus doing away with the columns heretofore employed. The appellations of perpendicular and flamboyant, by which this period is also known, arose from its peculiar modes of tracery. VI. THE RENAISSANCE OR REVIVAL. With the reformation came the gradual abandonment of the pointed styles, accompanied as it was by the check of freemasonry occasioned by the withdrawal of the patronage of the pope. The consequent architectural reaction sprang less from admiration and a thorough knowledge of the classic styles than from necessity. The return, however, to the rules of the ancient schools of design was progressive, save in Italy, where they had constantly exercised a powerful influence over the artistic spirit, the architecture of the country having retained through the middle ages the characteristics of the classic schools. We find here, however, several beautiful edifices, termed by the Italians *in maniera Tedesca*, which, notwithstanding a contradictory statement made by Muratori and Maffei, were the work of German artists. During the 14th century, or the *trecento* period, we discover in Italy, in the secular structures more especially, numerous examples exhibiting a return to the classic styles, which possess simplicity and boldness. At length, in the 16th century, the classic taste prevailed throughout Europe, and hence the different names, *cinque cento*, *renaissance*, revival, given to that style which supplanted everywhere the so-called Gothic architecture. Brunelleschi of Florence, who died in 1444, was among the first to encourage and disseminate this taste for a return to the classic architecture. He had numerous distinguished followers, among whom were Alberti, Bramante, Peruzzi, Sangallo, San Micheli, Palladio, Scamozzi, and many others, who obtained a well deserved reputation. In their productions the different elements of the classic style are happily introduced. The application of these elements to ecclesiastical, and more especially to secular structures, accounts for the liberties taken with them, among which we will cite the following: the great variety given to the intercolumniation of columns; the superposition of different orders, with and without broken entablatures; the frequent use of engaged columns and pilasters; the various

Flying Buttress, Chapter House, Lincoln.

forms given to the pediments; the substitution of columns for piers supporting arcades; the decoration of blank walls with medallions, foliage, and scrolls of various sorts, together with designs of animals arranged in imitation of ancient arabesques. These and many other so-called liberties originated a style peculiarly well adapted to the wants of modern civilization. Michel Angelo made several innovations in architecture, as well as in the other arts. He abolished many capricious ornaments; and instead of superimposing several orders, distinguishing as many stories, he employed one, comprising the whole height of the edifice. To him we are indebted for certain bold elements of design, although generally wanting in grace and purity. To his followers, Bernini, Boromini, Fontana, and others, is to be attributed in a great measure the decadence which followed the architecture of the 16th century. From Italy the renaissance was introduced into France. Among those who distinguished themselves in this kingdom were Pierre Lescot, Philibert de Lorme, and Jean Bullant. Later appeared De Brosse, Androuet du Cerceau, and finally Perrault, under Louis XIV. England boasts Inigo Jones, her Palladio, followed by Christopher Wren, Sir Robert Taylor, Sir William Chambers, and many others of merit and distinction. VII. Modern Architecture. The admirable architectural forms brought in by these men continue in use in all civilized countries to this day, and have been carried wherever European civilization has extended. Their reign has not, however, been undisputed. The spirit of scientific inquiry which has characterized the last hundred years has not only enlarged our knowledge of architectural forms, but has promoted a more exhaustive study of the principles of the art. New movements have accordingly arisen, avowedly actuated by these researches, directed either to improving the so-called classical style, or to supplanting it altogether. These two movements are known as the Greek and the Gothic revival. Both took their origin in England. The Greek revival dates from 1762, when Messrs. Stuart and Revett published the results of their researches among the antiquities of Attica. The Gothic revival may be said to date from Horace Walpole's works at Strawberry Hill about 100 years ago, but its modern development did not begin till about 1820. In England and the United States the Greek revival was merely a reproduction of the Greek buildings or parts of buildings, which, however beautiful in their original position, proved in the more gloomy climate of the north, and when executed in coarser materials, uninteresting and unattractive. The Greek originals, moreover, were almost exclusively temples, without windows, and surrounded by columns, a model utterly unsuited to modern uses. The attempted adoption of Greek details proved equally unsatisfactory. The movement made considerable mark in England, the British museum being perhaps its chief example. In this country the Greek style was adopted for the public buildings at Washington and for post offices, custom houses, hotels, and banks, in marble or granite, in all our principal cities. This fashion, for government buildings at least, has not yet passed away. Imitations of these works in wood were very common in the first half of this century, as may everywhere be witnessed in country towns; and a certain style of church with Greek details and a tower imitated from the choragic monument or the temple of the Winds is still common. In joinery, the Greek forms of mouldings both here and in England have become almost universal. In other countries the excitement caused by the discovery of Greek art was less superficial, and proved a more efficient inspiration. In Scotland, where the architecture has always exhibited much independence and local character, the "Greek" style, in the hands of Mr. Hamilton and the Adams brothers, shows great freedom of treatment and refinement of taste. More recently, in the hands of Mr. Thomson, at Glasgow, it has developed, with great elegance and beauty, forms perfectly adapted to modern uses. A similar effort was made in Germany, chiefly in Berlin and Munich, to reconcile the methods of the Greeks with modern needs; and in spite of a general effect of bareness and hardness, it is impossible to deny

Decorated Arch (Gothic), Dorchester, Oxfordshire.

to the best works of Schinkel and Klenze a good measure of admiration. It was only in France, however, in an atmosphere at once thoroughly artistic and highly intellectual, that the Greek revival showed enough vigor to throw aside the methods of the ancients and to create new forms. The pedantic fashions of the first empire, which however hardly extended their influence in architecture beyond the schools, gave place in the reign of Louis Philippe to a new style, which has been called the *néo-grecque*, or, to distinguish it from the Romanesque, founded upon Roman methods, the *romantique*, though it has little in common with the contemporary romantic school in literature. The column of July, parts of the Palais de Justice, the Bibliothèque Ste. Geneviève, and the Palais des Beaux Arts, by MM. Duc, Labrouste, and Duban, are the typical monuments of this style. Their erection marks a new era in architecture. Hardly a building of note has since been erected in France which has not been more or less affected by their example, and it has sensibly modified the related forms in use in Germany. The influence of this style is also extending in the United States, mainly through the agency of the *école des beaux arts* of Paris, whose pupils or pupils' pupils are rapidly multiplying here. Meanwhile in England, the Greek movement having failed, surviving only long enough to kill the Roman classical style, the field was left open for the revival of the mediæval architecture, which, fostered by ecclesiastical patronage and by archæological studies, has during the last 50 years gradually engrossed nearly all the talent of the country. Beginning, as the Greek revival began, with a period of pedantry and purism, under the guidance of the elder and younger Pugin, and used at first chiefly for ecclesiastical buildings, the ascendancy of the Gothic style was finally established when in 1840 it was decided to adopt it for the new houses of parliament. This great undertaking educated a large body of workmen in all the decorative arts of the middle ages, and gave an immense impulse to the Gothic movement. Subsequent works show not only greater knowledge and skill, but more freedom of mind, both in secular and ecclesiastical work. The works of Scott, Waterhouse, Street, Burges, and Butterfield exhibit this gradually increasing tendency. It may fairly be said that in the hands of these architects the "Victorian Gothic," as it has been called, differs as much from the various Gothic styles of the middle ages as they differ from each other. A similar movement has meanwhile been going on in France and Germany, but less successfully. In Germany, after long and not altogether happy efforts to revive round-arched or Lombardic styles, the proper pointed Gothic has been taken up, stimulated by the great works for the completion of the Cologne cathedral. The Votive church at Vienna is perhaps the most noteworthy example of this movement. In France a taste for mediæval work has found its chief field in the restoration, often amounting to reconstruction and completion, of cathedrals and other monuments; a work which, in the hands among others of MM. Lassus and Viollet-Le-duc, has been performed with consummate knowledge and skill. The new buildings in the pointed style seem, however, timid and ineffective, and it is in the Romanesque or round-arched Gothic that the French seem most at home. Its influence is seen not only in works avowedly mediæval, but much of the new Greek work so called, especially that in which the arch is used, recalls these models. The adherents of the Gothic revival in this country are as numerous and devoted as those of the Greek revival. But there is less partisanship here, perhaps, than abroad, and it is more common for architects to practise in both ways at once.—See Fergusson's "History of Architecture," Durand's *Parallèle*, Napoleon's *Égypte*, Stuart and Revett's "Attica," Letarouilly's "Rome," Viollet-le-Duc's *Dictionnaire*, Eastlake's "Gothic Revival," and the works of Piranesi, Gailhabaud, Penrose, Pugin, Ruskin, Daly, &c.; also "The Builder," *Revue générale d'architecture*, &c.

ARCHON (Gr. *ἀρχων*, ruler), a chief magistrate of ancient Athens, first chosen instead of a king after the death of Codrus, about 1068 B. C. Medon, the son of Codrus, was the first archon, and the office was hereditary in his family till 714 B. C., when it was thrown open to all the eupatridæ or patricians. Previous to 752 B. C. the archon held his office during life; at that time his term was limited to ten years, and in 683 to one; and at this latter epoch the office was divided among nine persons. Several years afterward the archonship was made accessible to the citizens generally, who were subject, however, to some restrictions as to qualification. The power of the archons became limited by degrees, and at last they had very little influence in the management of the government. One of the nine was called the archon, as being the chief of the whole body, and his duty was to superintend the greater Dionysiac festivals in honor of Bacchus, and the Thargelia in honor of Apollo and Diana, and to exercise a general care over orphans, and jurisdiction in matters relating to the law of inheritance. He was sometimes styled eponymus (*ἐπώνυμος*, one from whom something is named), because he gave the designation to the year, as did the consuls at Rome. The second archon was entitled king (*βασιλεύς*), as he occupied the place of the ancient kings with regard to all public religious worship. The third archon was called polemarch (*πολέμαρχος*, commander-in-chief), and originally had supreme control over the army; at the battle of Marathon we find him in command of the right wing. But it was at length found inexpedient to intrust this important function to a person chosen by lot; and after the battle of Marathon (490) the polemarch ceased to exercise such authority, his duties being in aftertimes confined to attending to the affairs of the alien residents of Athens, to the management of the funeral games in honor of Athenians who had fallen in battle for their country, and the superintendence of other similar rites. Each of these three archons was allowed two assistants, whose appointment had to be sanctioned by the senate. The rest of the archons were styled thesmothetæ (θεσμοθέται, lawgivers), though this name was also sometimes applied to the whole body. At the expiration of their year of office, the archons were obliged to submit to an examination as to the manner in which they had performed their duties, and, if such examination proved satisfactory, were admitted members of the court of the Areopagus.

ARCHYTAS OF TARENTUM, an Italian Greek philosopher, mathematician, general, and statesman, in the early part of the 4th century B. C. He is said to have been seven times general of the Tarentine forces, and to have always been victorious. He evinced no less capacity in political affairs. He was very intimate with Plato, was the first who applied mathematical principles to practical mechanics, and constructed various machines and automatons. He was accidentally drowned while crossing the Adriatic. A collection of the works ascribed to Archytas will be found in Orelli's *Opuscula Græcorum.*

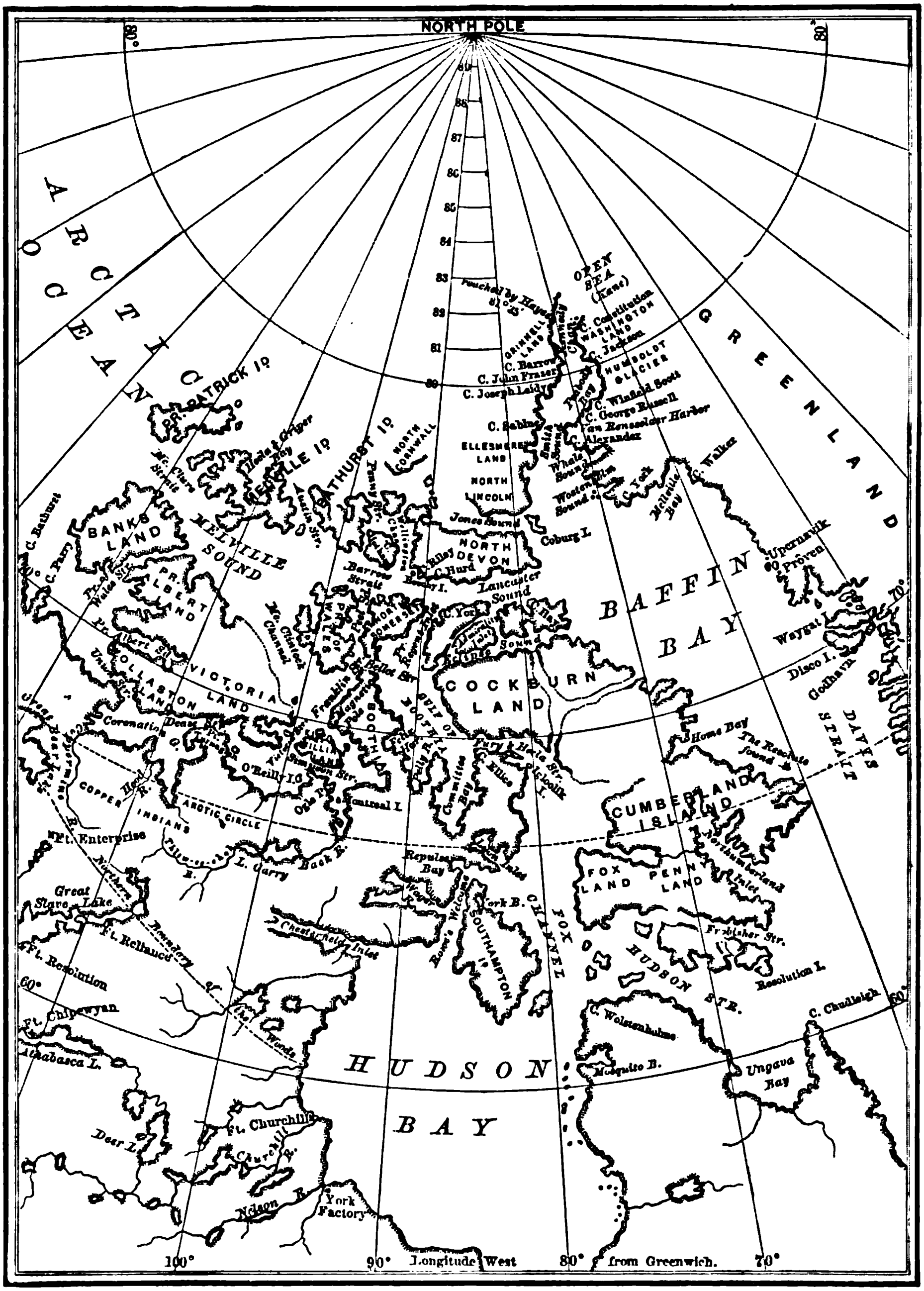
ARCIS-SUR-AUBE, a town of France, in Champagne, department of Aube, 16 m. N. by E. of Troyes; pop. in 1866, 2,820. It contains cotton and spinning manufactories and manufactories of cotton hosiery, and is an entrepot for iron and for the wooden wares made in the Vosges. Near this town, March 20 and 21, 1814, Napoleon fought the allied army under Schwartzenberg, before whose overwhelming numbers he was compelled to retreat on the second day, though rather successful on the first.

ARCOLE, a village of Venetia, on the Alpone, a small affluent of the Adige, 15 m. E. S. E. of Verona; pop. about 1,600. It is famous for the victory gained there by Napoleon in his first Italian campaign, over the Austrians, Nov. 15–17, 1796.

ARCOS DE LA FRONTERA (anc. *Arcobriga*), a town of Spain, in the province and 29 m. N. E. of Cadiz, situated on the Guadalete; pop. 11,500. The town is in a very strong position, and portions of its ancient walls and towers remain.

ARCOT. **I.** A district of the Carnatic, in the presidency of Madras, British India, divided into two collectorates, North and South Arcot, and lying between lat. 11° and 14° N. and lon. 78° and 80° E.; area, 12,459 sq. m., of which North Arcot contains 7,526, and South Arcot 4,933; pop. 2,638,174. The surface is low in the eastern part, but rises into hills in the western. The principal rivers are the Palaur, the Punnair, and the Coleroon. The climate is exceedingly hot and dry, and in the summer the beds of many of the streams are bare. This has led to the construction of huge tanks or artificial lakes, of which there are many in North Arcot; one at Caverypauk is 8 m. long and 3 m. wide. The soil when well irrigated produces good crops, principally of grain and cotton. Arcot was ceded to the British in 1801, on condition that they should pay the claims of the creditors of its former ruler, Azim ul-Omrah, nabob of the Carnatic. The committee appointed to investigate these claims found them immense, and a large sum from the annual revenue of the district was set apart for their payment. The finances of Arcot, especially under the maladministration of Hastings in India, while the province was partially conquered, but before its cession, had long before formed a subject of discussion in the English parliament, and concerning them Edmund Burke made one of his most famous speeches, Feb. 28, 1785. **II.** The principal town and capital of the preceding district, on the S. bank of the Palaur, 65 m. W. by S. of Madras; pop. about 60,000. It is surrounded by a wall; and the town itself is of comparatively modern construction, though a fortress, now partially destroyed, has existed for centuries. In 1751 Clive withstood here a remarkable siege of 50 days.

ARCTIC DISCOVERY. Until within a recent period it was believed that Columbus and Cabot were the actual first discoverers of the American continent. Careful researches on the part of northern antiquaries, however, would seem to prove that portions of the American coast—some maintain as far south as what is now Long Island—were known to the seamen or sea kings of Norway as early as the 9th and 10th centuries. Newfoundland and Greenland were the regions best known to these rovers. In 1000 a Norwegian, with a crew of Icelanders, landed on the coast of Massachusetts, which he named Vinland. This party erected monuments on an island in Baffin bay, where they were discovered in 1824. They established colonies on the Greenland coast, which flourished for some years, making great gains by the fisheries, which they pursued as far as Lancaster sound, and even to Barrow strait. Greenland and Spitzbergen were for several centuries prosperous colonies. Iceland, then at the height of its prosperity, found here a fair field for the enterprise of its inhabitants, who not only followed commerce and the fisheries, but propagated their faith in the new land, and built up numerous churches and convents, whose ruins are still found along the Greenland coasts. The Icelanders and Northmen, then, were the first arctic explorers. As the Greenland and Spitzbergen colonies perished, and the most important Icelandic expedition was lost and never heard from, while Iceland itself and the countries of the north were distracted by internal troubles, no trace of the discoveries made by these people was communicated to the rest of Europe. In 1890 two Venetian navigators, Zeno by name, voyaged to



the north, and brought back tidings of what they had seen. Their discoveries, however, resulted in nothing important. In 1497 the Cabots, John and Sebastian, landed in Labrador, and afterward projected a voyage toward the north pole. They penetrated as far as 67° 30′ N., that is to say, about half way up Davis strait. They hoped to sail westward around the northern extremity of the American continent, and thus reach the much desired Cathay. These, then, were the first seekers for the northwest passage. The next explorers were the brothers Cortereal, who made in all three voyages, extending as far as 60° N., but resulting in nothing but disaster to the adventurers and loss of life. This was in 1500–1502. In 1553 Sir Hugh Willoughby was sent out by the Muscovy company to find a northeast passage to Cathay and India. He penetrated to Nova Zembla, but was driven back by the ice as far as the mouth of the Arzina in Lapland, where he and his crew perished. In 1576–'8 Martin Frobisher made three voyages to the northwest. He discovered the entrance to Hudson and Frobisher straits leading into Hudson bay. These were the first voyages on which we hear of scientific investigations being made. In 1578 Sir Humphrey Gilbert, a relative of Sir Walter Raleigh, received authority to make a voyage of discovery on the American continent; but this, too, was practically without result. Next followed (1585–'7) Davis, who made more important accessions to a knowledge of the polar sea than any of his predecessors. He first fairly discovered the strait which bears his name, and surveyed portions of the coast of Greenland. These and other navigators, Danes, French, and Dutch, were stimulated to energetic efforts for finding a northern passage to India, in great part because Spain, then in her glory and power, monopolized the traffic across the Atlantic and Indian oceans, and dealt summarily with all intruders.—The Dutch persevered in their search for a northeast passage. William Barentz made three voyages in this direction, 1594–'6. He and his crew suffered much, and, so far as the prime object of their expedition was concerned, accomplished nothing material. Barentz himself perished on the third voyage, when his crew were in boats near the Icy cape, a headland of Nova Zembla in the Arctic ocean. Henry Hudson set out in 1607, under the auspices of the Muscovy company, with orders to steer directly toward the north pole. He advanced beyond lat. 80°, steering due north between Greenland and Spitzbergen, and returned convinced that a passage in that direction was impossible. The following year (1608) he tried to discover a northeast passage to India, between Nova Zembla and Spitzbergen. He pushed forward as far as lat. 75°, and returned the same year. The next year he tried again, but, finding his way impeded by ice, returned and sailed westward, and, searching along the American coast for a passageway, discovered the bay of New York and the river which bears his name. In 1610 Hudson set sail upon a fourth expedition. He sailed up the strait named after him into the mouth of Hudson bay, penetrating several hundred miles further to the west than any one had ever gone before. The expedition wintered on one of the islands in the mouth of the bay. Their progress in the spring was beset with storms, the provisions gave out, the crew mutinied, and finally a portion of the mutineers returned to England without Hudson, whom they set adrift to perish.—It was now supposed that Hudson bay was a great outlet into the Pacific waters, and sanguine expectations were entertained that here would be found the desired northwest passage. Within the next five years several expeditions were made into Hudson bay; and two important channels, Fox channel and Sir Thomas Rowe's Welcome, were partially explored. In 1616 Baffin explored the bay called after him, even entering the mouth of Lancaster sound. Baffin's survey was very exact, and for upward of 50 years after his explorations no navigator penetrated beyond him. Meantime, however, the Russians were seeking, by overland expeditions through Siberia, and by vessels through Behring strait, to establish the practicability of a passage to the northeast. On one of these expeditions the extreme variation of the magnetic needle was first closely remarked. In 1741 Behring set sail with an expedition from the harbor of St. Peter and St. Paul (Petropavlovsk) in Kamtchatka. After various buffetings before severe gales, having twice made the American coast and been driven off to sea, Behring died; the vessels were wrecked; the crews wintered on an island known as Behring island, built a small vessel the following spring, and finally reached Kamtchatka Aug. 25, 1742. Only a bare mention can be made of the expeditions of Shalaroff (1760), who perished of starvation with all his crew; of Andreyeff; and of Capt. Billings, who started from the mouth of the Kolyma in Siberia. None of these resulted in important additions to the stock of geographical knowledge; and so we come to the last of the Russian efforts—the sledge expeditions of Von Wrangell and Anjou, in 1820–'23. These explorers penetrated to lat. 70° 51′ N., lon. 157° 25′ W., and reported an open sea in the distant north, which precluded further operations with sledges. The natives whom they met at various points spoke of land still further north, but they did not see it.—Hudson bay was yet considered a great outlet toward the northwest, and in 1743 the British parliament offered a reward of £20,000 to the crew who should accomplish a northwest passage through it. Between 1769 and 1772 Samuel Hearne made three overland journeys north toward the polar sea. In the third he discovered and traced to its mouth the Coppermine river. From this time forth the arctic explorations were no longer merely for purposes of advantaging commerce, but in great part for scientific objects. In 1773 Capt. Phipps (Lord Mulgrave) was sent out with instructions to reach the north pole. Sailing along the shores of Spitzbergen, he reached lat. 80° 48′—about as far north as Hudson had gone. In 1776 Capt. Cook sailed on his last expedition, with instructions to attempt the polar sea by way of Behring strait. He penetrated only to lat. 70° 45′. A vessel was despatched to Baffin bay to await him, but the ice formed a solid barrier across his path. Previous to Cook's expedition the conditions of the parliamentary reward had been extended so as to include any northern passage for ships, and an additional reward of £5,000 was offered to the crew that should penetrate to within 1° of the pole. In 1789 Mackenzie, in a land expedition, discovered and traced to its mouth the river called after him.—The next two expeditions set sail in 1818: one under the command of Capt. Ross and Lieut. Parry, to discover the northwest passage; the other under Capt. Buchan and Lieut. (Sir John) Franklin, to penetrate to the north pole. Of the latter expedition the objects were entirely scientific. The commanders were instructed to pass northward between Spitzbergen and Greenland without stop, and to make every effort to reach the pole. They found the temperature along the western shore of Spitzbergen unexpectedly mild; but they did not succeed in penetrating further than 80° 34′, and did not get clear of the ice without encountering great danger. One of the ships, the Dorothea, being much shattered by the ice, the expedition was finally abandoned, and the two vessels returned home. With the other expedition it was proposed to explore the great openings reported by Baffin to exist at the western extreme of Baffin bay. The expedition sailed April 18, 1818, passed along the Greenland coast, and finally, Aug. 30, entered Lancaster sound. They were now upon unexplored ground. It was not supposed that Lancaster sound was in point of fact more than a bay, and the vessels were steered into it with many misgivings. After sailing up some 60 m. it was thought that land was discovered, extending completely across from shore to shore of the supposed bay; and, the weather threatening a storm, the vessels were put about. After exploring the coast to the southward and eastward for some distance, the vessels returned to England, where they arrived in October of the same year. Capt. Ross reported Lancaster sound to be a bay through which there was no practicable outlet to the ocean beyond. In this opinion several of his officers by no means agreed; and it appears that he failed to convince the scientific public of England of the correctness of his view.—Lieut. Parry, who was as positive and sanguine that Lancaster inlet was a sound as was Ross that it was a bay, was intrusted with another expedition. The Hecla was his own vessel. The Griper, under the command of Lieut. Liddon, was the consort. The expedition numbered 94 men, and was fitted out with provisions for two years. The vessels sailed May 11, 1819, first fell in with ice June 18, and found themselves firmly beleaguered on the 25th. They entered Lancaster sound July 30, but it was not till Aug. 3 that both vessels were able to lay their course fairly up the channel. Then they made a rapid run as far as the mouth of Barrow strait, and on passing the mouth of Prince Regent inlet had advanced further than any mariners had ever gone before them. They were approaching the magnetic pole, and found their compasses of little use. Proceeding through Melville sound, on Sept. 4 Parry announced to his crew that, having passed the 110th meridian, they were entitled to the reward of £5,000 offered by parliament for this achievement. On Sept. 20 they were imbedded in ice, and further progress was stopped. They cut their way out and returned to Melville island, where they passed the winter. On Aug. 2 of the following year the mass of ice broke up and floated out, setting the explorers at liberty. By the 15th they were again imbedded in ice, having made but little advance. They finally put about for home, reaching Britain in safety, and with the crews in a healthy condition. So successful a voyage raised high the expectations of all interested, and it was determined to send Parry out again. He accordingly sailed, in command of the Hecla and Fury, in May, 1821, with instructions to make for Repulse bay by way of Hudson strait, with the expectation of thus avoiding much of the ice. —Before this, however, in September, 1819, an overland expedition was sent out from York Factory, on the western shore of Hudson bay, with instructions to explore the northern coast of America, from the mouth of the Coppermine eastward. This expedition consisted of Lieut. (Sir John) Franklin, Dr. (Sir John) Richardson, two midshipmen, Messrs. Hood and Back, and a seaman named Hepburn. In the event of Parry's making the coast on his first expedition, the two expeditions were to co-operate. They reached Chipewyan on March 26, having accomplished a foot journey of 856 m. with the weather so intensely cold that the mercury sank to the bulb of the thermometer and then froze. In July, 1820, they travelled 500 m. more to Fort Enterprise, where the party wintered, while Mr. (Sir George) Back returned to Fort Chipewyan, to hurry along the supplies necessary for the next season's operations. Mr. Back, after innumerable hardships, returned to Fort Enterprise March 17, 1821, having travelled over 1,100 m., sometimes two or three days without tasting food, with no covering at night but a blanket and deerskins, and with the thermometer ranging between 47° and 57° below zero. On June 30, 1821, the party having dragged their canoes and supplies from Fort Enterprise to the Coppermine, 80 m., embarked on that stream and floated seaward. They reached the sea July 18, and immediately commenced paddling to the east. They sailed and paddled along shore 550 m., and imagined themselves upon the point of emerging into the vast Arctic ocean, when, to their dismay, they discovered that they had just reached the bottom of a huge bay. With but three days' provisions remaining, they turned back, Sept. 1, and, unable even to reach their starting point, built two small canoes of their larger ones, and ascended Hood river, a short distance west of Point Turnagain, the spot where they gave up further progress eastward. Short of food, in a country deserted by animals, ill provided with all that could facilitate their progress, eating the remains of their old shoes and whatever scraps of leather they had, obliged from exhaustion to abandon their canoes when they came to rapids, subsisting at the last upon rock tripe and mosses, disappointed in finding assistance at a station where they had expected it, the sufferings of the party were almost unparalleled, and such as but few men could have endured. They lost two of their companions, and in July, 1822, reached York Factory, whence they had started three years before. In these three years they had made a journey of over 5,500 m., without accomplishing their object.—Meantime, Captains Parry and Lyon, in the Fury and Hecla, made Southampton island, the terminus of Hudson strait, early in August, 1821, and immediately steered to the north up Fox channel. Passing a bay hitherto unknown, which they named after the duke of York, they entered Repulse bay, in the hope of finding here an outlet toward the Arctic ocean. Leaving Repulse bay, they started upon the exploration of a hitherto entirely unknown region. They made slow progress, exploring every indentation of the coast. Toward the close of September the ice began to accumulate, and Parry was obliged to cut into a large floe, and make there a winter harbor for his vessels. It was July before they were once more free of ice, and able to make progress on their voyage. They made their way up Fox channel slowly, against a current setting to the southward, and reached, Aug. 14, the small island of Igloolik, situated at the entrance of a strait called afterward the strait of the Fury and Hecla. The ships were long detained here by ice, reached the middle of the strait only in September, and were obliged to return to Igloolik for the winter, Oct. 30. The next spring (1823) proved unfavorable. The expeditions by land were able to effect but little, on account of the extreme ruggedness of the shore. The first week in August was past before the ships were released from their harbor; and Parry, who saw all advance to the north prevented, returned home, arriving in England in October, 1823.—Four expeditions were now fitted out. The first, consisting of two ships, under Parry, was to try Prince Regent inlet, which it was supposed would be found to open at its southern extreme into the Arctic sea. The second party, under the command of Franklin, was to descend the Mackenzie river to the sea, and there divide, one party turning to the east, the other endeavoring to penetrate westward, even to Behring strait. Captain Beechey, in the Blossom, was despatched around Cape Horn, to sail through Behring strait and make headway to the east as far as Kotzebue sound, where he was to wait for Franklin's overland party. The fourth expedition (Capt. Lyon, in the Griper) was to pass to the south of Southampton island, up Sir Thomas Rowe's Welcome, to Repulse bay; then to cross the Melville isthmus, and survey the coast as far as Franklin's Point Turnagain. This expedition was unfortunate; the vessel was twice nearly wrecked, and the expedition was abandoned when yet 80 m. distant from Repulse bay. Parry's expedition sailed in May, 1824, entered Lancaster sound in September, got into the ice, and was obliged to winter in Port Bowen, near the entrance of the sound. The following July, when starting forward again, the Fury was wrecked, and Parry returned to England in the Hecla, with a double crew. The only object gained by this disastrous expedition was a contrivance whereby the compass was made to work perfectly under all circumstances, and in all places, no matter how near the magnetic pole, thus obviating a most serious difficulty in arctic navigation. This was accomplished by simply placing a small circular plate of iron near the compass.—We come now to Franklin's expedition. The officers forming his staff were Dr. Richardson, Lieut. Back, Mr. Kendall, and Mr. T. Drummond, a naturalist. They arrived at Fort Chipewyan in July, 1825; passed on to Great Bear lake, where the party were to winter; and thence a small party with Franklin descended the Mackenzie to the sea, which they reached at a point in lat. 69° 14′, lon. 135° 57′, 1,045 m. from Great Slave lake. On June 28, 1826, the whole party again started from their quarters down the Mackenzie. The expedition separated, according to the previously planned course of operations. Franklin, going to the westward, reached the sea, and penetrated as far west as Return Reef, in lat. 70° 24′ and lon. 149° 37′ W., whence on Aug. 18 he set out on his return to the Mackenzie, the weather becoming bad, and he being unaware that Beechey was waiting for him but 146 m. to the westward. The latter, in the Blossom, had passed through Behring strait and anchored near Chamisso island, in Kotzebue sound, on July 22. He waited here till the advancing season made further stay dangerous, and then sailed for Petropavlovsk. The following year (1827) he again anchored in Kotzebue sound, but of course did not meet Franklin's party as he had hoped. Franklin traced the coast for 374 m. from the mouth of the Mackenzie. His voyage extended over 2,000 m. The other party, under Dr. Richardson, accomplished but little. The whole expedition wintered at Great Bear lake, where Franklin instituted a series of observations on terrestrial magnetism.—In 1806 Mr. Scoresby, a whaleman and private discoverer, accompanied by his son, had penetrated as far as 81° 30′ north, further than any one had gone before him. Buchan and Franklin so completely failed in the ship expedition in 1818, that Mr. Scoresby was led to advise an expedition to proceed by boats so fixed on sledges as to be easily dragged over the ice. Capt. Parry received the command of an expedition fitted out in accordance with this idea. Two boats, covered, well built, and set upon sledges, were to be landed upon the northern shore of Spitzbergen, whence they were to be dragged or sailed as ice or water presented itself. It was June 20, 1827, before Parry started with his boats, which contained 71 days' provisions. They met with many difficulties from the outset—thin ice, rough ice, short tracts of water interspersed with shorter tracts of ice, and snow-blindness among the crews. The last evil they obviated by travelling altogether at night, completely reversing the usual order of living, and for many days sleeping regularly by day and pushing forward by night. In five days of unremitting exertions, from June 24 to 29, they made but 10 m. due north. The ice on which they travelled moved to the south in a body about as fast as they could move northward, and on reaching 82° 45′ they gave up their attempt to reach the pole. They were then by observation distant from the Hecla 172 m. To attain this distance they had actually passed over 292 m. of ice and water; and having to make several of their days' journey over three or four times on account of the moving ice, it was calculated that they really travelled 668 m. They returned from this most discouraging and laborious expedition Aug. 21.—The object of the expedition fitted out by Sir Felix Booth, and commanded by Capt. Ross and his nephew, Commander (Sir James) Ross, in the Victory, a vessel fitted to use steam in calm weather, was to find a northwest passage by some opening leading out of Prince Regent inlet. The Victory sailed in May, 1829, entered Prince Regent inlet Aug. 9, made the scene of the Fury's wreck on the 12th, and on the 15th reached the furthest point achieved by Parry. During the months of August and September the explorers worked their way along 300 m. of hitherto undiscovered coast, and finally reached a point only about 200 m. distant from the extreme point reached by Franklin on his last expedition from the westward. On Oct. 7 they went into winter quarters at a place they named Felix harbor. Sept. 17, 1830, they once more got under way. After making 3 m. they again entered winter quarters, where they remained till Aug. 28, 1831. After making 4 m. (which consumed a month's time) they again, Sept. 27, went into winter quarters. It was during April, 1831, that Capt. Ross, on a sledging expedition, for the first time reached and fixed the position of the true magnetic pole. The spot was in lat. 70° 5′ 17″, and lon. 96° 46′ 45″ W. Scurvy appearing among the crew, it was finally deemed best to abandon the ship, and with the boats on sledges to make for the place of the Fury's former wreck. After almost incredible hardships they reached this spot July 1, 1832, having left their ship April 23. Here, on Fury beach, they were obliged to pass another winter—1832-'3. The men suffered much, and several died. They started again for the open sea July 8, 1833, and on Aug. 26 descried a vessel, which took them on board. The captain refused at first to believe that Capt. Ross and his crew stood before him. They had been given up for dead for two years past. On Sept. 30, 1833, they reached the Orkneys, having been absent since May, 1829.—In February, 1833, Back, with Dr. King, a naturalist and surgeon, left England for an overland expedition in search of Ross's party. They reached Fort Resolution, on the Great Slave lake, Aug. 8, passed on to the north and east, but returned to winter at Fort Reliance, where they suffered terribly from scarcity of food and a temperature of 102° below the freezing point. On April 25, when they were preparing to start for the seacoast to the north and east, they received news of the safety of Ross and his party. On June 28 they launched their boats on the Thlew-ee-choh or Great Fish (afterward called Back) river, which they hoped would take them to the polar sea. After a difficult navigation of 530 m. they reached the ocean, at lat. 67° 11′ N. and lon. 94° 30′ W., and pushed on along shore; but they met with constant impediments, and were finally, Aug. 14, obliged to turn back. The extreme point they reached was in lat. 68° 13′ N. and lon. 94° 58′ W. Back returned to England in September, 1835, and in June, 1836, set out in the Terror to complete the exploration of the supposed water connection between Ross's winter harbor, in Prince Regent inlet, and Point Turnagain, which Ross had so vainly attempted to reach. They were unfortunate from the first, and accomplished nothing.—Simultaneously with this expedition, the Hudson Bay company sent out two men, Dease and Simpson, to descend the Mackenzie river to the sea, and follow the coast to the west, as far as the point from which Beechey turned back to go out of Behring strait. This would complete the survey of all that part of the American shores. They reached Return Reef, Franklin's furthest point (August, 1826), in July, 1837. Beyond this no one had ever been. They reached Point Barrow, the extreme point attained by Beechey in 1826, Aug. 4, and thus completed their task. They discovered on the way two large rivers, which they called the Garry and the Colville. Returning to winter quarters on Great Bear lake, they started on another expedition to explore to the eastward, in June, 1838. Reaching the coast by way of the Coppermine, and finding their progress stopped by the ice, a portion of the party set out to the eastward on an overland expedition. Passing Franklin's Point Turnagain, the furthest point hitherto reached from the west, they discovered an ice-encumbered strait (Dease strait), and at its eastern extremity a large headland. To the north lay an extensive tract of land, now first seen, and which they called Victoria land. Surmounting the icebound cape, the explorers, to their surprise, found the sea beyond entirely free of ice, Victoria land stretching for 40 m. to the E. N. E., and the American coast trending to the S. E. This was the limit of their explorations in

1838. In an expedition the following year they sailed through Dease strait, and not only settled the coast line up to the spot which Back had reached in 1834, but went beyond, and explored the estuary of Back, which here forms a deep indentation in the northern coast of the American continent. In fact, they joined their discoveries very nearly to those of Ross, and were at one time within 90 m. of the place he fixed upon as the locality, during that year, of the magnetic pole.—The entire American coast, along the polar sea, was now explored, except that portion lying between Dease and Simpson's extreme point on the west of Boothia and Ross's winter quarters on the east side of the same land, and that tract lying between Ross's winter quarters and the extreme point reached by Parry in 1822, at the entrance of the strait of the Fury and Hecla. The main question now was on the possibility of passing with ships between Boothia and the American mainland, as, if this were possible, the passage down Prince Regent channel would be the easiest one for the accomplishment of a voyage to the northwest. To settle this question the Hudson Bay company in 1846 sent out Dr. John Rae. He and his party reached Chesterfield inlet July 13, 1846, passed Repulse bay safely, and conveyed their boats thence into Committee bay, at the bottom of Boothia gulf. Wintering at Repulse bay, the result asked for from their expedition was not attained till 1847. On April 5 of that year they started again into Committee bay. On the 18th they reached an inlet which Sir John Ross had before discovered, in one of his land excursions, during his two winters' sojourn on the coast of Boothia, and (Ross having established the continuity of the coast to that point) thus proved that Boothia is connected with the American mainland, and that consequently there is no outlet toward the west through Prince Regent inlet. Returning to recruit, May 12, Dr. Rae set out to explore the E. shore of Committee bay, and connect his surveys, if possible, with those of Parry (1822) in the Fury and Hecla strait. On May 27 the party reached a point from which, during an interlude in the storm, they saw a headland, which Rae calls Cape Ellice, and computes to be in lat. 69° 42′ N. and lon. 85° 8′ W., that is to say, within 10 m. of the Fury and Hecla strait. This completed the entire survey, with the exception of Fury and Hecla strait itself; and thus was finished, with this exception, a geographical exploration of the N. coast of the entire American continent, on May 27, 1847.—We come now to the last voyage of Sir John Franklin. The achievement of a northwest passage was his life dream, and to him was intrusted a new and—so it was hoped—final expedition. The Erebus and the Terror, long tried in arctic navigation, were the vessels chosen for the voyage. Each was fitted with a small steam engine and screw propeller. Sir John Franklin commanded the Erebus, Capt. Richard Crozier the Terror. The vessels sailed May 19, 1845, in company with a tender, with additional stores. This tender was relieved and sent home in Davis strait, where the vessels were fully provisioned and equipped for a three years' stay. On July 26, 1845, they were seen by a whale ship, in lat. 74° 48′ and lon. 66° 13′, about the centre of Baffin bay, moored to an iceberg, and awaiting an opening into Lancaster sound. This is the last time the vessels were ever seen. The instructions of the admiralty directed Franklin, after sending home the transport from Davis strait, to make the best of his way to Baffin bay, and through this into Lancaster sound; then to push westward in about lat. 74° 15′ as far as about lon. 98° W. From that point Franklin was to penetrate to the southward and westward toward Behring strait. Toward the close of 1847, nothing having been heard of the expedition, alarm began to be felt as to its safety, and early the following year (1848) three different expeditions for succor were despatched by the British government. The first of these, in the Plover, Commander Thomas Moore, and the Herald, Capt. Kellett, was to enter Behring strait, and advance at least as far as Chamisso island, in Kotzebue sound, and then to examine the coast further to the eastward in boats. The expedition was joined by the Nancy Dawson, a pleasure yacht owned and commanded by Mr. Robert Sheddon, who took a very active part in all the operations. The vessels reached Chamisso island, July 14, 1849, proceeded immediately on to Icy point, and thence sent the boat expedition on to explore, if possible, as far as the Mackenzie river. The vessels meantime stood to the north, until, in lat. 72° 51′ and lon. 163° 48′, they were brought to by densely packed ice. Still exploring, on Aug. 17 they discovered some islands, and a large body of land, in about lat. 71° 30′. On Aug. 24 part of the boat expedition rejoined the vessels, the remainder, two whale boats, having been despatched, according to previous instructions, up the Mackenzie river, to proceed homeward by way of Fort Hope and York Factory. The returned boats had explored the shore as far as Dease inlet, but had found no traces of the lost voyagers. The following summer (1850) the two vessels reëxplored the same ground, but again without meeting with any traces of Franklin. The Plover, Capt. Kellett, was left to winter in Grantley harbor, and the Herald returned home. Meantime part of the land party, under Sir John Richardson, reached the polar sea, Aug. 4, 1848, making deposits of pemmican by the way, at convenient points, along Mackenzie river. They then explored the shore to the east for 800 m., to the mouth of the Coppermine, but found no traces of Sir John Franklin. The next summer (1849) Sir John Richardson having returned to England, Dr. Rae explored the shores of Wollaston sound, and in 1850 he repeated his explorations, but with no more success. The third expedition, under command of Sir James Ross, sailed from England May 12, 1848, explored the S. side of Lancaster sound as far as Cape York, and thence across the mouth of Prince Regent inlet, wintered at Leopold harbor, and the following spring (1849) explored the shores of North Somerset as far as lat. 72° 38′ and lon. 95° 40′ W., concluding that North Somerset and Boothia were united by a narrow isthmus, where Bellot strait was afterward found. They also explored portions of the shore N. of Barrow strait, and both sides of Prince Regent inlet. The expedition returned to England Nov. 3, 1849, without having fallen upon any traces of Franklin. The general opinion of those best acquainted with arctic navigation, and with Sir John Franklin, was that his party was icebound among the islands to the westward of Melville island. Thither, therefore, were the next efforts mainly to be directed.—In March, 1849, the British government gave notice that £20,000 would be awarded to any private exploring party, of any country, which should render efficient aid to the missing explorers. In 1849 Lady Franklin had a supply of coals and provisions landed upon Cape Hay, S. side of Lancaster sound. In 1850 three new expeditions were sent out by the British government, with instructions mainly identical with those of 1848. The year 1850 was, however, to see many more expeditions than these three of the government. In fact, there were in all no fewer than eight. First on the list comes the continuation of Dr. Rae's expedition of 1849. He was to penetrate further to the north than he had been able to do before, and to examine the shores of Banks land, the coast about Cape Walker, and the N. side of Victoria land. Two smaller parties were at the same time to follow the mainland to the westward, toward Point Barrow, one descending the Mackenzie, the other the Colville. Next comes the Behring strait expedition, consisting of the Enterprise, Capt. Collinson, and the Investigator, Commander McClure. They were instructed to cruise in company as far to the eastward as they could get; to make friends of the Esquimaux; to make occasional deposits of provisions; and to prevent by every means any detention of the vessels in the ice. The Investigator and Plover (the last already in the Pacific) were last in getting through Behring strait. The Baffin bay expedition, sent out by the government, consisted of the Resolute, Capt. Austin, and the Assistance, Capt. Ommaney—sailing vessels—and the Pioneer and Intrepid, Capt. Sherard Osborn, both screw propeller steamers. The instructions to this expedition were mainly of a similar tenor to those given the Behring strait commanders. This fleet sailed in the spring of 1850. The schooner Felix and a small tender, the Mary, formed an expedition put forward by public subscription, and commanded by Sir John Ross. He sailed in April, 1850, provisioned for 18 months, and designing to commence at Cape Hotham, at the W. side of the entrance of Wellington channel, and examine all the headlands to Banks land. Finding nothing, he then intended to leave his tender and push forward for a second season in the Felix. The Lady Franklin, fitted out by Lady Franklin, and commanded by Capt. Penny, with the brig Sophia, sailed also in 1850, intending to explore as circumstances should seem to direct, but having a general plan somewhat similar to the government expedition. Lady Franklin also fitted out and defrayed two thirds of the expense of another expedition, consisting of the schooner Prince Albert, commanded by Commander Charles Forsyth and Mr. W. P. Snow, both volunteers. Their object was to examine the shores of Prince Regent inlet and the gulf of Boothia, and to send out overland travelling parties to explore the W. side of Boothia, down to Dease and Simpson strait. The Albert sailed in June, 1850. The Advance and Rescue, under the command of Lieut. De Haven, formed an American expedition, fitted out by the United States government, but at the cost chiefly of Mr. Henry Grinnell of New York. This expedition left New York May 24, 1850. Its plan was to push forward without delay toward Banks land and Melville island, and generally make the best use of every opportunity for exploring in that direction. Lastly comes the North Star, a transport ship, containing stores for the expedition of Sir James Ross. She wintered at the head of Wostenholm sound, in lat. 76° 33′, further north than any vessel ever wintered except Dr. Kane's, and returned to England in September, 1850. It will be seen that there were now no fewer than 11 vessels, exclusive of the North Star, in the eastern arctic waters.—Capt. Ommaney of the Assistance came upon the first traces of the missing mariners at Cape Riley, Aug. 23, 1850. A more minute examination of the country immediately surrounding gave indisputable proof that Franklin's party had sojourned about there for some time. The site of a tent paved with small stones, quantities of birds' bones lying around, as also meat canisters, were the traces discovered at Cape Riley. At Beechey island, about 3 m. W. of the cape, and just at the entrance of Wellington channel, Lieut. Osborn finally came upon an encampment of the party—in fact, the first winter quarters of Sir John Franklin. The objects here discovered were a large number of empty meat tins, the embankment of a house, with carpenters' and armorers' working places, and other remains of a large establishment, and finally, the graves of three men belonging to the Erebus and Terror, which bore date of the winter of 1845–'6. Further on, on the island, there were the remains of a garden, and various articles of apparel lying about. Lieut. De Haven, of the American expedition, visited the place on Aug. 25, and made another thorough search. The officers of the Prince Albert, as well as Capt. Penny, also examined the entire ground very minutely. Singularly, not all this searching brought to light any document which could give the slightest trace of the future intentions of the party. The government ships wintered but little distance from each other; and the spring of 1851 was devoted to land expeditions, in which the shores of Wellington channel, the coast of Banks land, and the waters leading from Barrow strait to Melville island, were to be thoroughly explored. The various parties made a thorough search on their different routes, and explored 675 m. of hitherto undiscovered coast, but found no trace of the lost. Lieut. McClintock's party reached on this occasion the furthest western limit ever attained by arctic explorers starting from Baffin bay, a point in lon. 114° 20′ W. and lat. 74° 38′. From the tameness of animals found hereabout it would seem that few if any human beings had ever touched this point before. Dr. Kane's opinion, on examining the sledge tracks about Cape Riley, was that Sir John Franklin had passed to the north, with his ships, on the breaking up of the ice in 1846; had gone through Wellington channel into the supposed great polar basin, and had never returned. The American expedition, which had gallantly led the way wherever they could go, and whose commander earned for himself at the hands of the English the sobriquet of "the mad Yankee," after undergoing much suffering and considerable danger, arrived in New York, the Advance on Sept. 30, and the Rescue on Oct. 8, 1851. On June 3, 1851, the Prince Albert, which had brought to England news of the discovery at Beechey island, was despatched by Lady Franklin on another expedition to explore the shores of Prince Regent inlet. She returned in October, 1853. The conclusion drawn from the failure of all the expeditions, including Dr. Rae's of 1851, which was very thorough, was that Franklin had never reached so far south as the American mainland, or the peninsulas connected with it. —Sir John Ross had brought back a report that the Franklin party had been murdered in Wostenholm sound by the Esquimaux. To establish the truth or falsity of this rumor, Lady Franklin sent the Isabel screw steamer, Commander Inglefield, to explore this sound. He left England in July, 1852; examined Wostenholm sound, finding no traces of the missing ones; sailed up Smith sound to lat. 78° 28′ 21″, 140 m. further than previous navigators had reached; found, as he thought, a more genial climate than existed to the south; and established in this voyage the presence of a strait or channel connecting Baffin bay with the great polar basin. Meantime, following the Wellington channel theory, Sir Edward Belcher was sent out in April, 1852, in command of five vessels, the Assistance, Resolute, North Star, Pioneer, and Intrepid—the last two steamers. The North Star was to be the depot and store ship; the Resolute and Intrepid were to steer west, to the assistance of Collinson and McClure; and the Assistance and Pioneer were to push up Wellington channel.—In the spring of 1853 more expeditions were sent out. The chief of these was that fitted out by Mr. Grinnell of New York, Mr. Peabody of London, and others, and commanded by Dr. E. K. Kane, who had acted as surgeon, naturalist, and historian of the former Grinnell expedition, under De Haven. Lady Franklin sent out the Rattlesnake and Isabel, steamer, for Behring strait, to assist Collinson and McClure. Dr. Rae was despatched for another exploration of Boothia. And finally, the Lady Franklin and Phœnix, Capt. Inglefield, were sent to Barrow strait, to aid Sir Edward Belcher. With Inglefield on this expedition was Bellot, a gallant young Frenchman, who was lost Aug. 18, 1853, by being blown off some floating ice. The westward expedition of Belcher made a number of explorations in the general direction of their line of search, toward Melville island. They found no traces of Franklin, but fortunately succeeded in finding and rescuing McClure and his ship's company, who had been buried in the arctic ice since the summer of 1850, three years. These returned home with Belcher, abandoning their ship, and are thus the first and only ship's company who ever entered Behring strait and returned to Europe by Baffin bay. Thus was established, at last, the great fact that there is a continuous passage by water from Baffin bay to Behring strait, parallel with the coast of the American continent. McClure reached in his ship in 1850 a point within 60 m. of the western terminus of Barrow strait, and thus had nearly passed through with his vessel. The crews under Belcher's command had meantime made extensive explorations by land during the spring and autumn of 1853, and the spring of 1854. The Assistance and Pioneer penetrated up Wellington channel to lat. 78° 10′, making various discoveries of new land and islands. When the vessels were brought to by ice, the officers set out on sledges, and penetrated overland to a point which Belcher considered an opening into Jones sound from the east. Here, to their surprise, as early as May 20, all sledging operations were stopped by open water. They found at various points structures of ice too well built to be the work of natives, but nowhere the slightest tangible trace of Sir John Franklin. In the spring of 1854 the vessels composing the expedition, the Assistance, Resolute, Pioneer, Intrepid, and McClure's ship, the Investigator, were abandoned, their crews taken on board the North Star, Phœnix, and Talbot, and the entire party arrived in England in September, 1854. It must be mentioned here that McClure, in August, 1850, discovered in the ear of an Esquimaux chief, near the mouth of Mackenzie river, a flat brass button. On being asked where he obtained this, the chief made answer that it had been taken from the ear of a white man who had been killed by one of his tribe. The white man belonged to a party which had landed at Point Warren, near the mouth of the Mackenzie, and there built a house. Nobody knew how they came, as they had no boat; but they went inland. The man killed had strayed from the party, and he (the chief) and his son had buried him on a hill at a little distance. When or the exact spot where this occurred could not be ascertained. Neither the grave nor the house was found. Collinson, McClure's companion on the Behring strait expedition, eventually returned to England by the way he came. He made numerous discoveries of land, and explorations in the neighborhood of Banks land, Wollaston land, Albert land, and Victoria land. At Cambridge bay in Prince Albert sound, in about lat. 70° and lon. 117°, where his vessel passed the winter of 1852–'3, he saw in the possession of the Esquimaux a piece of iron and fragments of a hatch frame or doorway. These he thought must have belonged to Franklin's ships; but he was unable to obtain any intelligence in regard to the manner in which the Esquimaux came into possession of them.—There remained now Dr. Rae's expedition to Boothia, and Dr. Kane's American expedition, to hear from. Dr. Rae reached Pelly bay, on the S. W. side of the gulf of Boothia, N. W. of Committee bay, in April, 1854. Here he met Esquimaux who had in their possession various articles of silverware, &c., belonging to officers of both the Erebus and Terror. The intelligence obtained by him of the natives may be summed up as follows: In the spring of 1850 some Esquimaux killing seals near the N. shore of a large island known as King William land (some distance westward of Pelly bay), saw a party of about 40 white men pass to the southward, along the W. shore of this island. They were dragging a boat and sledges with them. They could not speak Esquimaux, but the natives gathered that their ships had been crushed, and they were now going where they could find deer to shoot. They purchased a little provision from the natives, who judged that they were nearly destitute of food. The officer with them was described as a tall, stout, middle-aged man. At a later date, the same season, but previous to the disruption of the ice, the corpses of some 30 persons, and some graves, were discovered on the continent, and five dead bodies on an island near it, about a long day's journey N. W. of the mouth of a large river supposed to be Back river. Of the bodies on the island, one was supposed to be a chief, as he had a telescope slung about his neck. These men, from all appearances, had been driven to cannibalism before they perished. From the fact that shots were heard, and the feathers of wild fowl were found near the bodies, it is conjectured that a few of the men survived till May, 1851. They seem to have had an abundance of ammunition. There were also numbers of telescopes, guns, watches, &c., pieces of which articles were found among the natives by Dr. Rae, in considerable quantities. Dr. Rae's opinion was that the party died by starvation, and not by the hands of the natives. Mr. James Anderson was sent out in 1855, to explore more perfectly the spot designated as the scene of so much suffering. On June 30, a little way from the mouth of Back river, he came upon some Esquimaux, who had with them numerous articles belonging to a boat equipage. The natives stated that the owners of these articles had died of starvation. On reaching Montreal island, where the five men had perished, according to report, Mr. Anderson found chain hooks, tools, rope, bunting, and a number of sticks strung together, on one of which was carved the name of Mr. Stanley, surgeon of the Erebus. On a plank was found the word "Terror." Not a vestige of the remains, nor any paper, was found. At Point Ogle some small articles were also found, but no bodies. The party were unable to reach King William land, the scene of the chief disaster.—Dr. Kane, the American explorer, sailed in the Advance from New York, May 30, 1853. The discoveries of Inglefield in Smith strait, and those of Belcher at the head of Wellington channel, had convinced him that there was somewhere between lat. 80° N. and the north pole a vast open sea, and a milder climate than was found some degrees to the south; and further, that in this sea were to be sought, and he hoped found, tidings of Sir John Franklin's long absent expedition. His determination was therefore to penetrate as far up Smith strait as possible, in the hope of being able to enter the polar sea, and there have clear water for his explorations. He entered the ice Aug. 2, and on the 20th found shelter from a hurricane under lee of a rocky island, which he named Godsend ledge. Leaving his men, on the subsidence of the gale, to tow the vessel along the ice, Dr. Kane, Aug. 29, passed ahead with a boating party to explore the coast. He thus passed numerous points of land, and reached Cape George Russell, whence he saw the great glacier of Humboldt, with Cape Jackson on one side, Cape Barrow on the other, and a sea of solid ice between. Not finding on this trip a good place for winter quarters, he returned, and the Advance was moored for the winter in Van Rensselaer harbor, in lat. 78° 37′ and lon. 70° 40′. During the continuance of daylight in the autumn excursions were made into the interior of Greenland, in which over 800 m. were traversed, and the coast was traced for 125 m. to the north and east. Kane's winter harbor was further north than that of any previous expedition. The crew were much enfeebled by the long winter, and it was not till April that Kane started on his chief sledging tour to the north. Owing to the severity of the climate and great obstacles, the expedition failed in its main object; but they discovered on this trip some remarkable natural features: the Three Brother Turrets, Tennyson's Monument, and the great glacier of Humboldt. They returned to the vessels May 14. Dr. Hayes and William Godfrey started on another expedition May 20. They crossed Smith strait, and attained to lat. 79° 45′ and lon. 69° 12. They saw, 30 m. ahead, two capes, which they named Capes Joseph Leidy and John Frazer. On June 30 Messrs. McGary and Bonsall left on a third expedition, Kane being yet ill. They reached Humboldt glacier on the 15th. Four of the party returned on the 24th, entirely blind. Two, Mr. Morton and a companion, pushed on, and on June 21 saw open water to the north, called by them Kennedy channel. They penetrated as far as Cape Constitution in Washington land, lat. 81° 27′. The open channel abounded with animal life, such as bears, birds, and seals. The results of this excursion seemed to Kane to prove that Smith strait in fact opens into Kennedy channel, and this into a great open polar sea, abounding with life. The shores of Kennedy channel and Smith strait had been explored for 760 m. Mr. Morton returned to the ship on July 10. Dr. Kane, seeing no probability of the release of his vessels during this summer, determined to communicate with Belcher's expedition. Failing in this, it was determined that part of the crew should abandon the vessel. The party, however, returned after a few days, and the crew were beset for another winter. It was resolved to abandon the brig in early spring, and make for the Danish settlements at the south. On May 17 they left in boats and sledges, and, after much privation and many narrow escapes, reached Upernavik Aug. 9, in 84 days from the time of leaving the Advance. Fears for Kane's safety had induced the United States navy department to send out in the spring of 1855 two vessels, the Release and the steamer Arctic, to the relief of the missing brig's crew. Capt. Hartstene, who commanded this expedition, reached lat. 78° 32′, and then found his onward progress stopped by a firm barrier of ice. Returning, he found Kane and his crew at Upernavik, and returned with them to the United States in the fall of 1855. In a scientific point of view, Dr. Kane's expedition attained most important results. These are thus summed up by himself in his report to the navy department of the United States:

1. The survey and delineation of the N. coast of Greenland to its termination by a great glacier.

2. The survey of this glacial mass, and its extension northward into the new land named Washington.

3. The discovery of a large channel to the northwest, free from ice, and leading into an open and expanding area, equally free. The whole embraces an iceless area of 4,200 m.

4. The discovery and delineation of a large tract of land, forming the extension northward of the American continent.

5. The completed survey of the American coast to the south and west, as far as Cape Sabine; thus connecting our survey with the last determined position of Captain Inglefield, and completing the circuit of the straits and bay heretofore known at their southernmost opening as Smith sound.

—The Resclute, one of Sir E. Belcher's expedition, was, as before mentioned, abandoned May 15, 1854, not far from Beechey island. On Sept. 15, 1855, she was discovered by Capt. Buddington, of the George Henry, whale ship, of New London, off the W. shore of Baffin bay, in lat. 67° N. The vessel was encumbered with ice, but was perfectly tight and seaworthy. The distance between the place where she was abandoned and that where she was retaken was at least 1,200 m. She was brought to New London, purchased by the United States government by order of congress, thoroughly refitted, and presented to Queen Victoria and the British government, in December, 1856. The British government took possession of her, and had her stripped and laid up in ordinary in Woolwich dockyard.—In 1857 Lady Franklin, having resolved to send out a vessel at her own expense for a fresh search for her husband, offered the command of the proposed expedition to Capt. Francis McClintock, who had served with distinction in the arctic expedition with Sir James Ross, Capt. Austin, and Sir Edward Belcher. (See McClintock.) The screw steamer Fox, of only 177 tons, formerly the pleasure yacht of Sir Richard Sutton, was purchased, refitted, and equipped with a crew of 24 volunteers. Capt. Allen Young of the merchant service contributed to the cost, and also acted gratuitously as sailing master. Lieut. W. R. Hobson, Dr. David Walker, and Carl Petersen, interpreter, so favorably known as the companion of Dr. Kane, were the principal other members of the party. The little vessel left Aberdeen July 1. McClintock's plan was to examine a tract about 300 m. square lying W. of Boothia, and between the northern limits of the explorations of Rae and Anderson and the southern boundaries of those of Sir James Ross, Austin, and Belcher, while to the west he expected to penetrate as far as the track of Collinson and McClure. Having purchased 35 Esquimaux dogs at Disco, on the coast of Greenland, and taken on board two of the natives as drivers, the Fox pushed on toward Lancaster sound until on Aug. 17 she was beset in Baffin bay nearly opposite the entrance to that channel. For eight months the ice held her fast, but the moving pack meanwhile carried her back upon her course, and when finally released, April 25, 1858, she had drifted 1,395 m. to the southward. McClintock refitted at Holsteinborg, arrived in Lancaster sound July 12, sailed through Barrow strait, and attempted to pass down Peel sound, between North Somerset and Prince of Wales land; but having been stopped here by the ice, he passed northeastward around North Somerset in the hope of reaching the mouth of Back river through Bellot strait, which is the water communication between Prince Regent inlet and the western sea (now known as Franklin strait), and separates the North American continent from North Somerset. He found the strait obstructed by moving ice, but after much difficulty and danger pushed through it on Sept. 6. A frozen barrier stretched across its western end, and here the Fox remained moored for three weeks, when she took up her winter quarters at Port Kennedy, on the N. shore of the strait. In the mean time extensive sledge journeys were undertaken. Lieut. Hobson carried out provisions toward the magnetic pole, Capt. Young established a depot on the further side of Franklin strait, and McClintock and Petersen travelled southward in the hope of gathering some information from the natives. On March 1, 1859, McClintock met a party of Esquimaux near Cape Victoria, and learned from them that several years before a ship had been crushed in the ice and sunk in deep water off the N. W. shore of King William land. Her people went away to a great river, where they all died of starvation, and their bodies were found the next year. It was impossible to obtain any information respecting the number of white men, or the length of time since they left the ship. Another interview with some of the natives in April confirmed these statements, and threw light upon the fate of Franklin's second vessel, which they said drifted ashore at King William land. The skeleton of one man was found on board. Sending Hobson to search for the wreck, McClintock explored the E. shore of King William land, and on May 7 came upon a village of Esquimaux, from whom he learned that when the white people marched toward the great river "many of them dropped by the way," and their bodies were found the next winter; some were buried and others were not. Point Ogle, Montreal island in the estuary of Back river, and Barrow inlet were searched, with no better success than the discovery of a few scraps of iron, tin, and copper; and McClintock, having now reached the track of Anderson and Stuart (1855), resolved to follow the S. and W. coasts of King William land until he met Hobson. The first trace of the long lost crew was found near Cape Herschel, the western limit of Simpson's explorations. It was a bleached skeleton lying at full length on the beach; fragments of European clothing, a pocketbook, and a few letters were picked up about it. A day's march N. E. of Cape Crozier the party came across a boat fitted to a sledge and apparently prepared for navigating the river. In it were two skeletons, two loaded guns, and various other relics, including Sir John Franklin's silver plate, besides fuel, ammunition, chocolate, tea, and tobacco. Its head was turned toward the abandoned ships, from whose first position it was about 65 m. distant. A record was also found which had been left here five days before by Hobson, who in the mean time had made still more interesting discoveries. After separating from McClintock he had tracked the N. and W. shores of King William land almost to Cape Herschel. Near Cape Felix, the northermost point of the island, he found a ruined cairn, three tents, and other traces of Franklin's party, but no record; two smaller cairns were afterward examined, and on May 6 a large one was observed at Point Victory, where Sir James Ross had touched in 1830. Lying among some stones which had fallen from the top of the structure was a tin case enclosing a record, the first authentic account ever obtained of the history of the lost expedition. It was written on one of the printed forms used in discovery ships for the purpose of being enclosed in bottles and thrown overboard in order to ascertain the direction of the currents. It read as follows:

> 28 of May, 1847.—H. M. ships Erebus and Terror. Wintered in the ice in lat. 70° 5′ N., lon. 98° 23′ W. Having wintered in 1846–'7 at Beechey island in lat. 74° 43′ 28″ N., lon. 91° 39′ 15″ W., after having ascended Wellington channel to lat. 77° and returned by the W. side of Cornwallis island. Sir John Franklin commanding the expedition. All well. Party consisting of 2 officers and 6 men left the ships on Monday, 24th May, 1847. Wm. Gore, Lieut.; Chas. F. Des Vœux, Mate.

Around the margin was written in a different hand:

> April 25, 1848.—H. M. ships Terror and Erebus were deserted on the 22d April, 5 leagues N. N. W. of this, having been beset since 12th Sept. 1846. The officers and crews, consisting of 105 souls, under the command of Captain F. R. M. Crozier, landed here—in lat. 69° 37′ 42″, lon. 98° 4′ 15″. This paper was found by Lt. Irving under the cairn supposed to have been built by Sir James Ross in 1831, 4 miles to the northward, where it had been deposited by the late Commander Gore in June, 1847. Sir James Ross's pillar has not however been found, and the paper has been transferred to this position, which is that in which Sir J. Ross's pillar was erected. Sir John Franklin died on the 11th June, 1847, and the total loss by deaths in the expedition has been to this date 9 officers and 15 men.* JAMES FITZJAMES, Captain
> F. R. M. CROZIER, H. M. S. Erebus.
> Captain and senior offr.
> and start on to-morrow, 26th,
> for Back's Fish river.

The date 1846–'7 given as that of Franklin's wintering at Beechey island is evidently an error; it should be 1845–'6. Vast quantities of clothing and other articles were found here. The wreck was not seen, nor were any more skeletons found; but this indeed was hardly to have been expected, as the route toward Back river was almost all the way over ice which breaks up in summer. Meeting no more of the Esquimaux nor further traces of the lost voyagers, and feeling certain that the whole expedition had perished, McClintock returned to his vessel, June 19, carrying a great number of relics, many of which had been purchased from the natives. Besides solving the problem which had engaged arctic enterprise for 11 years, his expedition had completed the delineation of the N. shore of the American continent; laid down the previously unknown outline of Boothia and the coast of King William land; proved the navigability of Bellot strait, the existence of which was before doubted; opened a new and capacious channel extending N. W. from Victoria strait to Parry or Melville sound, and since named at the suggestion of Lady Franklin McClintock channel; observed many interesting facts in terrestrial magnetism; and finally, proved Sir John Franklin to be the discoverer of the northwest passage. With the aid of McClintock's narrative we are now able

* These figures make the original force of Franklin's expedition 129, whereas it has commonly been stated at 138. It has been ascertained, however, that only 134 actually left England, and 5 of these returned.

to trace out Franklin's last voyage. During the first season it was unusually prosperous. Passing up Lancaster sound, he explored Wellington channel (then an unknown sea) to a point further N. than was reached by either Penny, De Haven, or Belcher; sailed around Cornwallis island, and wintered at Beechey island. In the spring and summer of 1846 he either navigated Bellot strait, or more probably pushed through Peel sound, reaching Victoria strait, where he was finally beset in September, and thus supplied the only link wanting to complete a chain of water communication between the two oceans. The skeletons found in the boat near Cape Crozier show that after the abandonment of the Erebus and Terror a party attempted to return, for what purpose can only be conjectured. The Fox found herself free from ice on Aug. 9, and immediately made sail for home, reaching the Isle of Wight Sept. 20. See McClintock's "Narrative of the Discovery of the Fate of Sir John Franklin and his Companions" (London and Boston, 1860); also "The Search for Sir John Franklin," in the "Cornhill Magazine," No. I., January, 1860 (by Capt. Allen Young).—Dr. Isaac I. Hayes, a member of Kane's party, and a firm believer in the theory of the open polar sea, soon succeeded, with the aid of private subscriptions, in organizing and fitting out another arctic exploring expedition. With a company of only 14 men, he left Boston July 6, 1860, in the schooner United States, and proceeded directly to the Greenland ports of Pröven and Upernavik; at the latter place he arrived Aug. 12, and besides adding to his crew three Danes and three Esquimaux hunters, he secured sledge dogs for the winter's work. Carruthers, one of the schooner's crew, died at Upernavik. Leaving port, Dr. Hayes's expedition entered Baffin bay about Aug. 20, but was so delayed by ice, among which the schooner was often becalmed, that although the party had hoped to reach some point between lat. 79° and 80°, the schooner was frozen in at a point but little N. of lat. 78°, in a harbor which Hayes named Port Foulke. During the winter Dr. Hayes made several sledge expeditions, but attained no important results until April 3, when, with several sledges drawn by dogs, a life boat upon another sledge drawn by men, and 12 of the ship's company, he started from Port Foulke to cross Smith sound to Grinnell land; for along the coast of this Hayes had determined to proceed, all progress along the E. shore of the sound being prevented by impassable glaciers. After encountering difficulties of every kind, and after sending back nearly all of the party and several sledges, with the life boat, which could be carried no further, Hayes and three of his men succeeded (May 11) in reaching Grinnell land at a point called Cape Hawks. They immediately turned to the north, and for several days skirted the coast, travelling on smoother ice and with less danger than before. But Hayes's companions were greatly exhausted, and he was finally compelled to leave two of them. On May 18, 1861, Dr. Hayes and his remaining companion, Knorr, who had been travelling among soft ice for several days, reached a point (lat. 81° 35′, lon. 70° 30′) beyond which further progress was impossible on account of rotten ice and cracks. This was the most northerly land ever reached; and, climbing a headland, Hayes found himself standing upon what he believed to be the shores of the polar sea, which, though then encumbered with soft ice and floes, would, he felt confident, be entirely open in the summer months. To the north he saw a lofty headland, "the most northern known land upon the globe." Having no boat, Hayes was obliged to turn back; rejoining all his companions, he reached the schooner about the 1st of June, after a wearisome journey. Without making further important explorations, for which the schooner had been unfitted by injuries from the ice and storms, the expedition returned successfully to Boston in October, 1861. The civil war had broken out, and this led Dr. Hayes to at once abandon the project he had formed of returning immediately with a steamer to the arctic seas. In his story of the voyage ("The Open Polar Sea," New York, 1867), he declared that he had by no means given up the ultimate accomplishment of his plan.—In 1860 Capt. Charles F. Hall, who had for more than ten years been deeply interested in arctic discovery, left New London, Conn., in a whale ship, which, in pursuance of his plan, landed him on the W. coast of Davis strait, whence he intended, with boat and sledge, to make further search for evidences of the fate of Sir John Franklin and his men. He lost his boat, and was obliged to confine his explorations within comparatively narrow limits. He made, however, an important discovery—some traces of the expedition under Frobisher, 300 years before. On Sept. 30 Hall returned. In 1864 he again sailed for the arctic countries, landing, with only two Esquimaux as companions, on the coast of Hudson bay. He penetrated to the north as far as Fury and Hecla strait, journeyed into King William land, and met with much success. Besides bringing home many actual relics of Franklin's party, he succeeded in obtaining such exact information from the Esquimaux at various points as led him to suppose that Franklin had actually accomplished the discovery of the northwest passage before his vessels, then in winter quarters (at O'Reilly island, Capt. Hall believes), were abandoned by their crews. Hall seems to have finally established, by the universal testimony of the tribes he visited, the truth of the Esquimaux story that Franklin's men died of starvation in King William land. He did not, however, succeed in finding any records of the expedition. After spending five successive years among the Esquimaux, passing much of the time near Repulse bay, and after acquiring a thorough knowledge of their language and customs, Capt. Hall returned in September, 1869, to the United States, where he applied himself to the organization of a new expedition.—A German arctic expedition, organized by Dr. Petermann of Gotha, and placed under the command of Capt. Koldewey, left Bremen in the spring of 1868, in the Greenland, a vessel of 80 tons burden. Leaving Bergen, Norway, in May, Koldewey succeeded in reaching a point in lat. 81° 5′ N., lon. 16° W. He returned in October to Bremen. In 1868 the Swedish government also sent out an expedition, which sailed to the north of Spitzbergen, but without any noteworthy discoveries.—In 1869 Dr. Hayes visited Upernavik to make preparations for the expedition he had not ceased to plan; he then hoped to undertake it during the year 1870. In a small steamer, the Panther, Dr. Hayes and his party made a short voyage about the arctic seas, but did not prosecute any extensive explorations.—On June 15, 1869, another German expedition left Bremen; the vessels were the Germania, under Capt. Hegemann, and the Hansa, under Capt. Koldewey. Through a mistake in the reading of signals, the two vessels parted in July, the Germania following the E. coast of Greenland, and wintering in Sabine bay; while the Hansa was wrecked in October among the ice along the shore. Her crew took refuge on a field of moving ice, which, as it floated southward, gradually diminished, until, after it had become a mere raft, they were obliged to take to their three boats, by means of which they finally reached Friedrichsthal, near Cape Farewell. They reached home in the summer of 1870. Meanwhile the Germania had endeavored, but without success, to reach high latitudes by following the E. coast of Greenland; and in the autumn she also returned to Bremen. Though the voyage contributed much to scientific knowledge, no new discoveries of importance were made by either of the crews. Several other expeditions were sent out from the continent of Europe in 1869, but they accomplished little beyond scientific research, conducted in regions already known.—Still less was done in 1870. Capt. Sherard Osborn, of the British navy, had for several years urged a new expedition by way of Smith sound in search of the open polar sea, but his views were not sustained by the board of admiralty, and he failed to secure aid from the government. A French scheme for arctic exploration was abandoned on account of the war with Germany.—In 1871 several arctic voyages were begun. In the summer James Lamont, an Englishman, sailed to the eastward of Greenland, but made no new discoveries. In June the Austrian lieutenants Payer and Weyprecht, in a small Norwegian sailing vessel, sailed from Tromsö, Norway, into the Arctic sea to the north of Nova Zembla, where they succeeded in discovering an open ocean in which navigation was only impeded by very light and scattered ice. In October they returned to Tromsö, having penetrated to lat. 78° 41′ N. Dr. Petermann, the German geographer, looks upon the discoveries made by this unpretending expedition as most important, as he believes that Payer and Weyprecht actually penetrated into the open polar sea, and found the entrance of the best, if not the only water passage to the neighborhood of the pole. Their discoveries seem also to confirm the theory originally advanced by Capt. Silas Bent of the U. S. navy, that the pole can best be reached by following the course of the Gulf stream northward between Spitzbergen and Nova Zembla; it is claimed by the supporters of this theory that the warmer water of the great current not only keeps the northern channel free from ice at this point, but is the cause of the open polar sea. An expedition fitted out by A. Rosenthal of Bremerhaven began in 1871 the exploration of the ocean N. of Siberia. The Norwegian captains Tobiesen and Mack confirmed the discovery of Payer and Weyprecht. Another Norwegian, Capt. Carlsen, discovered the remains of the winter quarters established 275 years before at the N. E. end of Nova Zembla by the Dutch captain Barentz. Ulve and Smyth sailed to the north of Spitzbergen and found open water even in lat. 80° 27′. Finally, Capt. Hall organized at last, with the aid of congress, his long desired American expedition toward the pole; and on June 29 he sailed from New York with a well selected corps of assistants and crew, in the wooden steamer Polaris, of about 400 tons. For nearly two years no important news was received from the explorers. On April 29, 1873, the British steamship Tigress struck an ice floe in lat. 53° 35′ N., lon. 55° W. On this floe were found Capt. Tyson, one of Hall's officers, and 18 others, who had been 196 days on the ice, and drifted about 2,000 miles. They reported that on Oct. 15, 1872, the Polaris being fast in the ice about lat. 77° 35′, and leaking badly, they had been ordered to land provisions; and that while so engaged the floe broke up, and they were separated from the ship and rapidly drifted southward, without seeing her again. Their report gave the following details of the expedition. Capt. Hall sailed up Kennedy channel and through a strait which he named Robeson, and on Aug. 24, 1871, reached lat. 82° 16′ N. It being deemed prudent to fall back, the Polaris was taken on Sept. 5 into winter quarters in Thank God bay, lat. 81° 38′ N. On Oct. 10 Capt. Hall started on a sledge expedition, but did not go beyond lat. 82°. On his return he was taken suddenly ill, and died on Nov. 8. The command then devolved on Capt. Buddington, who resolved to return, and on Aug. 12, 1872, the Polaris was turned southward. She drifted into Baffin bay, where Tyson left her. (See supplement.)

ARCTURUS (Gr. *ἀρκτος*, bear, and *οὐρος*, guard, or *οὐρά*, tail), formerly a constellation near the Great Bear. Later the name was confined to the largest star in the constellation, which was afterward called Boötes. It is a star of the first magnitude, and was at one time erroneously believed to be the star nearest to our system.

ARCUEIL, a village of France, department of Seine, on the Bièvre, 3½ m. S. of Paris; pop. in 1866, 5,024. It is celebrated for an aqueduct constructed there by the Roman emperor Julian during his abode in Paris, to convey water from the Bièvre to his palace. Remains of this are still seen near the modern aqueduct, constructed by Maria de' Medici in 1618, to bring water to supply the gardens and the palace of the Luxembourg and the fountains of Paris. Arcueil was for a long time the residence of the chemist Berthollet, whose friends, meeting here for scientific study under the name of *société d'Arcueil*, published several volumes of memoirs. The house of Berthollet is now a college of that branch of the Dominican order founded by Lacordaire.

ARCY, Grotto of, a vast and beautiful stalactitic cavern, which consists of many compartments, near Vermenton, department of Yonne, in France, 12 m. S. S. E. of Auxerre. The hill in which this remarkable cavern exists stretches into the valley of the river Cure. One of the compartments of the grotto is 1,200 feet long, 85 high, and 40 wide. In the first two compartments are found large blocks of stone, and in the second compartment is a spring of good water. In the other chambers stalactites hang from the roof, while stalagmites rise column-like from the ground. The caverns are supposed to have been quarries in former times, but have been abandoned so long that every trace of human labor is obliterated. It is said that the stone with which the cathedral of Auxerre was built was taken from the grotto of Arcy.

ARDABIL, Ardebil, or **Erdebil,** a town of Persia, in the province of Azerbijan, 110 m. E. of Tabriz, and 35 m. W. of the Caspian, situated 5,000 feet above the sea, at the foot of the Savalan mountains; pop. about 4,000. A fine and fertile situation has made it a favorite resort of Persian princes. Abbas Mirza had a fort built there as a protection against the Russians, who were for some time in possession of the town during the war of 1826–'8. It was flourishing in former centuries under the Suffites, whose founder as well as the first shah of that dynasty are buried here in a beautiful mausoleum which is a resort of pilgrims. The town has been devastated by earthquakes and is in decay, though still retaining some commercial importance.

ARDÈCHE, a S. E. department of France, bounded E. by the Rhône; area, 2,134 sq. m.; pop. in 1872, 380,277. The river Ardèche, from which it has its name, rises near its centre and flows S. S. E. to the Rhône. The Loire has its source near that of the Ardèche, and flows in the opposite direction. A large portion of the surface is occupied by branches of the Cévennes mountains. The department is rich in iron and coal, but deficient in agricultural products, though potatoes are largely raised, chestnuts are plentiful in the forests, and the pasturage is fine. Wine, silk, and wool are among the principal exports, as well as various manufactured goods, including famous stationery. Privas is the capital, and the other chief towns are Annonay and Aubenas. The department is divided into the three arrondissements of Privas, Largentière, and Tournon.

ARDENNES, a N. E. department of France, bounded N. by Belgium; area, 2,021 sq. m.; pop. in 1872, 320,217. The forest of the Ardennes, an elevated wooded tract, from which it is named, begins in its N. part, thence spreading in various branches, but chiefly along the Meuse and Sambre, over the Belgian provinces of Namur, Hainault, and Liége, and over Luxemburg. The department is also traversed, mainly in the east and centre, by ridges and offshoots of the Argonnes. The principal rivers are the Meuse and the Aisne. The valley of the latter is remarkable for its large crops, and there are other very fertile valleys. Among the sheep are several long-wooled and merino breeds; the horses are fine, and game abounds. There are iron, lead, calamine, and coal mines, and important slate and marble quarries. Nails and other iron wares, earthenware, glass, leather, woollens, firearms, and other articles are manufactured. Timber is the fuel used in the iron and copper works, besides being exported. The capital is Mézières. Sedan is the chief place for the manufacture of cloth, and Charleville for the iron trade. The department is divided into the arrondissements of Mézières, Rocroy, Rethel, Vouziers, and Sedan.

ARDESHIR, Ardshir, or **Artaxerxes, Babegan,** founder of the Persian dynasty of the Sassanides in A. D. 226, died about 240. According to a critical opinion not fully established, he was the son of Babek, son of Sassan, a shepherd, who claimed descent from the line of the ancient Persian kings; and the son gradually gained an importance which brought upon him the enmity of Artaban, the last ruler of the Parthian empire. Ardeshir then announced his intention to recover the throne of his ancestors and to exterminate the Arsacide usurpers. He gave battle to Artaban, whom he vanquished and put to death, and caused himself to be proclaimed *shahan shah*, "king of kings." He rapidly recovered the provinces constituting the old Persian empire, and even extended its limits. A war with the Romans was of short duration. During the years of profound repose which marked the latter part of his reign, he cultivated the arts of peace, and as a jurist and legislator showed remarkable capacity. His principal achievement at home was the restoration of the pure Zoroastrian religion.

ARDITI, Luigi, an Italian violinist and composer, born at Crescentino in Piedmont, July 22, 1822. He received his musical education in the conservatory at Milan, and first made himself known in public concerts as a violinist in 1839. In 1841 his opera *I Briganti* was produced at Milan. In 1851 he visited Havana and the United States, and was for several seasons conductor at the Italian opera houses in New York. While in that city he composed an opera entitled *La Spia*, the plot of which was based upon incidents in Cooper's novel "The Spy." To identify it as an American work, "Hail Columbia" was introduced as the finale. The opera was brought out at the New York academy of music March 24, 1856, but its merits did not entitle it to any great success. Shortly after this production Arditi went to London, where he became the leader of the opera at her majesty's theatre. His songs have met with a greater popularity than his more ambitious compositions.

ARE (from Lat. *area*, a broad piece of level ground), the unit of surface in the French system of measures, equivalent to a square décamètre, or 1,076·44 English square feet. Parts of an are are expressed by Latin prefixes, déciare, centiare, &c., signifying one tenth, one hundredth, &c., of an are. Multiples of an are have Greek prefixes, décare, hectare, &c., signifying ten, one hundred, &c., ares.

ARENDAL, a town of S. E. Norway, on a river of the same name, in the province and 40 m. N. E. of Christiansand; pop. in 1865, 7,181. It is built on piles and islands, and has been called "Little Venice" on account of its canals and picturesque appearance. The harbor is protected by the opposite island of Tromö, and there is an active trade in iron and timber.

AREOLAR TISSUE. See CELLULAR TISSUE.

AREOMETER. See HYDROMETER.

AREOPAGUS, the hill (Gr. πάγος) of Ares or Mars, a craggy eminence in ancient Athens, not far from the Acropolis, famous as the spot where the celebrated council or court of the same name held its sittings. This body was, above all similar courts of Greece, distinguished by its great antiquity and high character. Its origin is carried back by ancient writers as far as the time of Cecrops; but Solon is supposed to have framed, or at least greatly modified, the historical constitution of the Areopagus, and to have extended its functions, so that from being merely a criminal tribunal, its jurisdiction reached the general morals of society and the political affairs of the state—touched everything, in fact, which concerned the public weal. It is not known of how many members the Areopagus was composed, and possibly the number was unlimited, the members serving for life, and consisting of ex-archons of unspotted character. Pericles is said to have deprived it of a portion of its prerogatives, and later its members were made responsible to the people. Its fame was alive in the time of Cicero, and even as late as the emperor Theodosius. In the records of Christendom the hill of Mars is memorable as the spot where the apostle Paul commenced the delivery of a discourse, the outline of which is preserved in the book of Acts. There is no intimation that Paul was brought before the council of the Areopagus.

AREQUIPA. I. A S. department of Peru, bounded S. W. by the Pacific; area, about 45,000 sq. m.; pop. about 200,000. It is divided into the provinces of Arequipa, Islay, Castella, Camaná, Union, Condesuyos, and Cailloma. The eastern section is a high table land belonging to the Andes region; the rest lies between the main range of the Andes and the Pacific. The mountains are for the most part covered with perpetual snow, from which rises the volcano of Mistí or Arequipa to a height of about 20,000 ft. The western section is very fertile, and is watered by the Ocoña, Camaná, and other rivers, all of which flow to the Pacific. By reason of the diversity of elevation, almost every known vegetable product of the earth is raised. Oil, wine, and brandy of good quality are made, and the fruits of the department have earned for it the title of the garden of Peru. The western portion is covered with cattle, sheep, and goats, while the mountains and plateaux abound with llamas, alpacas, guanacos, vicuñas, and other wool-bearing quadrupeds. Silver, copper, tin, lead, sulphur, rock crystal, and coal are found. Earthquakes are very frequent and disastrous, and are invariably accompanied by eruptions of the volcanoes of Mistí, Omate, Tutupaca, and Ubinas. **II.** A town, capital of the preceding department, situated 7,850 feet above the sea, on the river Chili, 40 m. from the coast, in lat. 16° 30′ S., lon. 72° 20′ W., 480 m. S. W. of Lima, in the midst of a fertile district and near several gold and silver mines; pop. about 35,000. It was one of the best built towns in South America, having a cathedral and several other churches, 9 convents, a college, a hospital, and houses of stone solidly constructed and vaulted; but it was almost wholly destroyed by the earthquake of Aug. 13–15, 1868, in which nearly every house was levelled with the ground and 600 persons were killed. A similar disaster had

Volcano of Misti or Arequipa.

happened to the city on four previous occasions. Its ancient site was two leagues E. of the present one; the removal was made after Arequipa had been nearly buried in ashes from the volcano of Mistí in the 16th century.

ARES. See Mars.

ARETÆUS, a Greek physician of Cappadocia, flourished about A. D. 100. His contemporaries rank him next to Hippocrates. He wrote a comprehensive treatise, in eight books, on acute and chronic diseases, which is still extant, and was published by Wigan (Oxford, 1723) and by Kühn (Leipsic, 1828).

ARETHUSA, a fountain in the island of Ortygia, which formed a part of the ancient Syracuse, in Sicily. The ancients supposed its waters to be united with those of the river Alpheus in Peloponnesus. The naiad of the fountain was the nereid Arethusa. (See Alpheus.)—Another Arethusa was one of the Hesperides, the guardians of the golden apples, to obtain which was one of the 12 labors of Hercules.

ARETINO. I. Guido, or **Guido d'Arezzo,** a Benedictine monk, born at Arezzo near the end of the 10th century. He early occupied himself in devising new methods of writing and teaching music. Instead of a group of tetrachords like the Greek method, or of heptachords such as Gregory adopted, he proposed a new system, consisting of hexachords. The six syllables by which he designated his notes were suggested to him, it is said, by a Latin hymn to St. John:

UT queant laxis *RE*sonare fibris
*MI*ra gestorum *FA*muli tuorum,
*SOL*ve polluti *LA*bii reatum,
Sancte Johannes.

To the seventh note, *si*, he gave no name, and for a long time it continued to be called *b*. Guido's new method of solmization attracted much attention. Whereas ten years had been required to learn to read music, a chant could be mastered by this method in a few days, and a year sufficed to make a skilful singer. Pope John XVIII. (1024–'33) invited Guido to his court and was greatly pleased with his plan. Guido not only facilitated the reading of music, but simplified the manner of writing it. Since St. Gregory, attempts had been made to improve musical notation. Already the seven letters, formerly written on one line, were placed on parallel lines, to indicate the rising and falling of the voice. Guido, instead of repeating the letter, wrote it at the beginning of the line, and each time it occurred marked a point on the line. He ended by placing the points within the lines, thus rendering the written composition more compact. Guido has the fame of being the inventor of the modern gamut. **II.** See Bruni, Leonardo. **III. Pietro,** an Italian writer, born in Arezzo in 1492, died in Venice in 1557. He was the natural son of a gentleman named Luigi Bacci, and was brought up by his mother, Tita. While still very young he was obliged to leave his native city on account of having written a sonnet against indulgences, and went to Perugia, where for a long time he supported himself as a bookbinder. Thence he went on foot to Rome, and obtained employment in the service of Popes Leo X. and Clement VII.; but, having composed 16 sonnets for as many licentious designs of Giulio Romano, he was forced to retire to Arezzo (1524), and soon afterward to the court of Giovanni de' Medici. At length he returned to Rome, where he made love to a cook, and composed a sonnet in her praise. A Bolognese gentleman, Achille della Volta, was a rival lover, and finding Aretino one day alone, stabbed him five times in the breast and maimed his hands (1525). Displeased with the refusal of the pope to punish his assailant, Aretino sought once more the court of Giovanni de' Medici. This prince having been killed in battle in 1526, Aretino resolved to have no more protectors, but to support himself by his pen. With this view he went to Venice in 1527, where he chiefly passed the rest of his life, becoming reconciled with the pope in 1530. His end was peculiar. Having heard of some excesses of his sisters, he found them so comical that he threw himself back in his chair laughing, fell over backward, and was killed.

AREZZO. I. A province of Italy, in Tuscany; area, 1,276 sq. m.; pop. in 1872, 239,901. It is watered by the Arno, and includes the valley of the Chiana, 20 m. long, formerly a vast and pestilential marsh, but which has been drained within the last century and converted into about 40 sq. m. of the most fertile land of Italy and perhaps of Europe. Arezzo is famous for its wines, corn, oil, and fruits. Among the towns of this province are Cortona and Montepulciano. **II.** A city (anc. *Arretium* or *Aretium*), capital of the preceding province, situated in a fertile valley, near the confluence of the Chiana and Arno, about 36 m. S. E. of Florence; pop. 38,907. In antiquity it was one of the principal states of Etruria. Its extensive walls are undoubtedly Etruscan, and were of importance to the Romans as a barrier against the Cisalpine Gauls. It was celebrated for its terra-cotta vases, ranked by Pliny with those of Samos and Saguntum. During the contest of the Guelphs and Ghibellines, Arezzo, then a very populous city, fought against Florence, but was finally obliged to yield. Among the public buildings are the magnificent Loggie, by Vasari, the cathedral and several beautiful churches, the Museo Bacci, and the Palazzo Publico, which has upon its front a curious series of the armorial bearings of the successive podestas, amounting to several hundreds. It is the birthplace of a number of distinguished men, hence known by the surname of Aretino, as well as of Petrarch, Vasari, and others.

ARGÆUS, Mount. See Arjish.

ARGALI. See Sheep.

ARGALL, Samuel, one of the early adventurers to Virginia, born in Bristol, England, in 1572, died in 1639. His first public exploit was the abduction of Pocahontas, in 1612, from the care of a chief who had been intrusted by Powhatan with the charge of his daughter, but who surrendered her for the bribe of a brass kettle. Taking her to Jamestown, he gave her to the governor, Lord Delaware. In 1617 he became deputy governor of Virginia, in which office he demeaned himself so tyrannically that he was recalled in 1619, returning to England with immense wealth. Under the governorship of Sir Thomas Dale he commanded an expedition which sailed in 1613 to Port Royal in Nova Scotia, which place he reduced and plundered, driving the French colonists into the woods. He also destroyed the French settlement of St. Saviour on Mount Desert island. It has been stated that on his return to Virginia he appeared before New Amsterdam, and summoned the Hollanders to surrender their territory on the ground that Henry Hudson, its discoverer, was an Englishman; but Brodhead, in his "History of New York," arrives at the conclusion that the whole story is fabulous. After the death of Lord Delaware, Argall took charge of his estate, and letters of Lady Delaware now in existence accuse him of the most flagrant peculation.

ARGELANDER, Friedrich Wilhelm August, a German astronomer, born in Memel, March 22, 1799, died in Bonn, Feb. 19, 1875. He attended the university of Königsberg, and at first devoted himself to political science. His attention was turned to astronomy by the lectures of Bessel, and in 1821 he became his assistant in the observatory. In 1822 he was appointed an instructor in the university. In the same year he published his *Untersuchungen über die Bahn des grossen Kometen von* 1811, establishing the length of the comet's period as 2,840 years. In 1823 he was made chief of a new observatory at Abo, where he passed several years, publishing in 1830 and 1832 the results of his observations in 560 different cases (*Observationes Astronomicæ Aboæ factæ*, 3 vols., Helsingfors), and in 1835 the determination of the positions of the stars he had observed (*DLX Stellarum Fixarum Positiones Mediæ*). In 1837 appeared his great work, *Ueber die eigene Bewegung des Sonnensystems* (St. Petersburg), in which he proved the truth of Herschel's theory concerning the independent movement of the solar system. In 1832 he had been appointed a professor at the university of Helsingfors, and after superintending the building of an observatory, which was completed about the time of the publication of his last-mentioned work, he accepted a professorship at Bonn. Here also he took charge of the building of a new observatory, and completed it in 1845. He published in 1846 *Durchmusterung des nördlichen Himmels zwischen* 45° *and* 80° *nördlicher Breite* (Bonn). His other noteworthy works are: *Neue Uranographie* (Berlin, 1843); *Atlas des nördlichen gestirnten Himmels* (Bonn, 1857); and a catalogue of more than 216,000 stars, printed in the third and fourth volumes of the *Astronomische Beobachtungen auf der Sternwarte zu Bonn*. He was chosen a member of the French institute in 1850. For several years before his death he devoted himself to observations of variable stars.

ARGENS, Jean Baptiste de Boyer, marquis d', a French writer, born in Aix, June 24, 1704, died in Toulon, June 11, 1771. He entered the army, but in consequence of an escapade with an actress his relatives procured his appointment as secretary of legation to the French embassy at Constantinople. On his return from Turkey he again joined the army; but during the siege of Kehl he was wounded, and soon after a fall from his horse disabled him for military service. As his father had disinherited him, he took to literature to support himself; and availing himself of the liberty of the press in Holland, he published there his *Lettres juives*, *Lettres chinoises*, and *Lettres cabalistiques*, each in several volumes. These attracted the attention of the crown prince of Prussia, the future Frederick the Great, who wished him to come to Berlin; but D'Argens would not go, because, as he wrote in apology, he was afraid that his tall figure would tempt King Frederick William to enroll him in his army. However, after the accession of Frederick the marquis went to Potsdam, was appointed director of fine arts in the academy of Berlin, and was on the best of terms with the king until he married an actress without asking the royal consent. He then returned to France, where he remained till his death. His most important work is his *Histoire de l'esprit humain*.

ARGENSON, Voyer d', a distinguished French family of Touraine. **I. René Louis**, marquis d', born Oct. 18, 1694, died Jan. 10, 1757. In 1741 Louis XV. appointed him minister of foreign affairs, and he held this office till 1747, when the intrigues of Spain, whose policy he had frustrated in his negotiations with Italy, brought about his resignation. From that time he devoted himself principally to literature, and wrote, besides essays, *Considérations sur le gouvernement de la France*. **II. Marc Pierre**, count d', brother of the preceding, born Aug. 16, 1696, died in Paris, Aug. 22, 1764. He was for some time secretary of the war department under Louis XV., and in this capacity did much for France during the war which preceded and the peace which followed the treaty of Aix-la-Chapelle, in 1748. D'Alembert and Diderot dedicated to him their Encyclopædia, begun during his ministry, and he furnished Voltaire with valuable materials for his *Siècle de Louis XIV*. **III. Marc Antoine René de Palmy**, son of René Louis, born in 1722, died in 1787. He was ambassador in Switzerland, Poland, and Venice, but, disappointed in obtaining the Roman mission, he resigned his public offices and devoted himself to literary pursuits. He edited 40 volumes of the *Bibliothèque universelle des romans*, including some of his own novels. He was elected a member of the French academy, and appointed governor of the arsenal, and distinguished himself by the splendid collection of 150,000 volumes with which he endowed its library. **IV. Marc René**, grandson of René Louis, born in Paris, Sept. 10, 1771, died there, Aug. 2, 1842. He served for a time as adjutant of Gen. Lafayette. In 1809 he became prefect of the department of Deux-Nèthes (now province of Antwerp, Belgium), but relinquished his place on account of a disagreement with the ministry, caused by D'Argenson's refusal to sequester the property of the mayor of Antwerp. He took an active part in the expulsion of the English from Walcheren. During the hundred days he was a member of the house of representatives for Belfort, and belonged to the deputation who besought the allied forces to prevent the return of the Bourbons. He was reëlected as deputy after the second restoration, and distinguished himself by his eloquent denunciation of the massacre of the Protestants in the south of France. In 1830 he reëntered the chamber of deputies as member for Strasburg, and created a great sensation by taking his parliamentary oath with the words *Je le jure, sauf les progrès de la raison publique*. In May, 1832, he was one of the opposition members who signed the famous *Compte rendu*, and in October, 1833, he signed the manifesto of the *société des droits de l'homme*. He was one of the chief leaders of the secret society *charbonnerie démocratique*, and was designated as the future dictator of France in case of a revolution.

ARGENTAN, a town of France, in the department of Orne, in Normandy, situated on the river Orne, 22 m. N. by W. of Alençon; pop. in 1866, 5,401. It is finely situated on a hill in the midst of fertile plains; and the ramparts and ditches have been converted into promenades. There are two large Gothic churches and a college. Formerly the town was famous for its laces (*point d'Argentan* and *point d'Alençon*), but the chief industry consists at present in manufacturing gloves, leather, and embroidery, and in exporting cattle and cheese.

ARGENTEUIL, a town of France, in the department of Seine-et-Oise, on the Seine, 5 m. N. W. of Paris; pop. in 1866, 8,176. It carries on an active trade in wine of inferior quality. Among the adjoining country seats is the château du Marais, formerly owned by Mirabeau. The town originated from the convent or priory of Argenteuil founded in the 7th century, and converted by Charlemagne into a nunnery, of which Héloïse became abbess, after having been educated and taken vows there. Its ruins are still extant.

ARGENTEUIL, a W. county of the province of Quebec, Canada, bounded S. by the Ottawa river; area, 850 sq. m.; pop. in 1871, 12,806. The soil is in many parts of exceptionally good quality. There is a quarry of French buhrstone in Grenville township. Capital, Lachute.

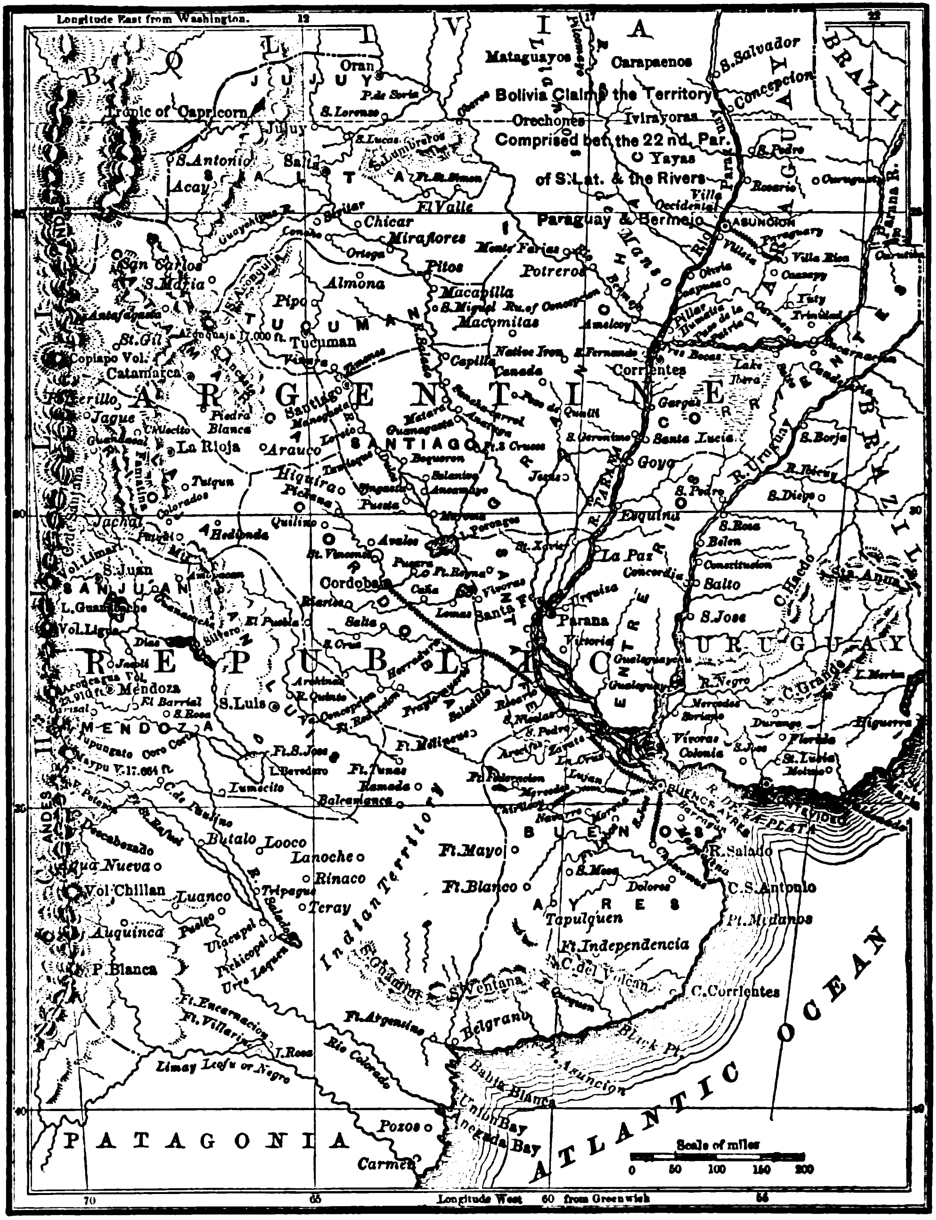
ARGENTEUS CODEX, an old uncial MS. of the four gospels in the Mœso-Gothic dialect, written or stamped in silver letters (except the initials, which are in gold) on violet-colored vellum. It is supposed to have been executed about the 6th century, and is a copy of the version made in the 4th by Ulfilas, the Arian bishop of the Mœso-Goths. This codex was discovered in the library of the Benedictine abbey of Werden in 1597, and after changing hands, either honestly or by stealth, several times, came at length into the possession of the library of Upsal for the consideration of about $1,250. Facsimile editions of some portions of it have been published by Knittel, and also by Angelo Mai (1819). Mai also discovered some palimpsests of this version in the Ambrosian library, which have been published. These more recent discoveries have aided to fill the chasms in the Argenteus Codex, and so to enhance its value to Biblical literature.

ARGENTINE REPUBLIC (*La República Argentina;* formerly more commonly called ARGENTINE CONFEDERATION), an independent state of South America, between lat. 21° and 41° S., and lon. 53° and 71° 17′ W., bounded N. by Bolivia, E. by Paraguay, Brazil, Uruguay, and the Atlantic, S. by the Atlantic ocean and Patagonia, from which it is separated by the Rio Negro, and W. by the Andes, separating it from Chili. The Argentines dispute with Chili the right to the territory S. of the Rio Negro as far as Tierra del Fuego, according to the original division by the government of Spain. The area of the republic, including the undisputed portion of the Gran Chaco, is 841,000 sq. m. If to this be added that part of the Chaco from the Bermejo N. to lat. 22°, as claimed by the government, the area would be about 1,000,000 sq. m. The 14 provinces into which the country is divided, with their area and population, according to the census of 1869, are as follows:

PROVINCES.	Area, sq. m.	Population.
LITTORAL OR RIVERINE PROVINCES.		
Buenos Ayres	70,000	343,866
Corrientes	60,000	120,198
Entre-Rios	50,000	115,968
Santa Fé	20,000	75,178
ANDINE PROVINCES.		
Catamarca	35,000	79,551
Mendoza	65,000	59,269
La Rioja	35,000	48,498
San Juan	33,000	58,007
CENTRAL PROVINCES.		
Córdoba	60,000	208,771
San Luis	20,000	52,761
Santiago del Estero	35,000	132,768
Tucuman	28,000	108,602
NORTHERN PROVINCES.		
Salta	50,000	85,959
Jujuy	30,000	37,857
Total	591,000	1,526,788

These figures show an increase of 146 per cent. as compared with the census of 1836. All the provincial capitals bear the names of their respective provinces except that of Entre-Rios, which is Concepcion (La Concepcion del

Uruguay). The chief towns, with their population in 1869, are: Buenos Ayres, 177,787; Corrientes, 10,670; Concepcion, 6,513; Santa Fé, 10,670; Catamarca, 5,718; Mendoza, 8,124; La Rioja, 4,489; San Juan, 8,353; Córdoba, 28,523; San Luis, 8,748; Santiago, 7,775; Tucuman, 17,438; Salta, 11,716; Jujuy, 3,072. These, added to the provincial population, and 47,276 absent at war, make a total population of 1,879,410. The number of immigrants in 1863 was 10,400; in 1864, 11,682; in 1865, 11,770; in 1866, 13,960; in 1867, 23,900; in 1868, 29,384; in 1869, 37,934; in 1870, 39,667; in 1871, over 40,000. The principal centres of immigration are Buenos Ayres, Santa Fé, Entre-Rios, Córdoba, Corrientes, Salta, and San Juan. The foreign population in the province of Buenos Ayres was set down in 1869 at 250,000, made up of the following elements: Italians, 70,000; Basques, 40,000; French, 30,-



000; Spaniards, 30,000; Irish, 30,000; English and Scotch, 10,000; Germans, 10,000; other nationalities, 30,000. The number of Italians at present in the province exceeds 60,000, upward of 40,000 of whom (or about one fourth of the entire population) are in the city of Buenos Ayres. In the upper provinces there are but few foreigners, Entre-Rios alone excepted, where they are numerous and engaged in all branches of industry. In Santa Fé there are three prosperous colonies. Córdoba has perhaps 1,500 settlers. The most numerous class of foreigners are Italians, who are in general skilled in the building trades, and have found constant employment in the various splendid buildings erected of late years in Buenos Ayres; many of them are also engaged in market gardening. The Genoese are chiefly occupied in river navigation, the monopoly of which is in their hands. Besides this advantage, the crews of the river and coasting crafts have often equal shares in the ventures. The Spaniards present a less striking contrast with the Argentines, the Catalans prospering as wine merchants, the Andalusians as cigar dealers and shopkeepers, while the Galicians perform the duties of street porters, night watchmen, and domestics. The Basques, after the Italians the most numerous foreign community, are mostly bricklayers, milkmen, shepherds, saladero peons, &c., though some are rich and at the head of lucrative enterprises. To the Irish is due the development of sheep farming that enables the Argentine provinces to rival Australia in the production of wool. Many of them number their acres by thousands, and their flocks by hundreds of thousands. The aggregate number of sheep owned by the Irish is estimated at 30,000,000. Of the French, who are the most equally distributed in the provinces, some are wealthy wine merchants, trading with Bordeaux, and in general they are found in every branch of commerce, especially the fancy trade, which they monopolize. They assimilate more with the Argentines than do the English and Germans. The English and North Americans are seldom occupied in other than mercantile pursuits. The Argentines (*Argentinos*) are naturally active and intelligent. The Gauchos, or horsemen of the plains, are descendants of the Spanish colonists, and many of them have sprung from the best families of the peninsula. They live in rude huts built of mud, and subsist almost entirely on the flesh of oxen and game, both of which abound in the pampas, and are taken with the *lazo* or the *bolas*, a missile weapon wielded with astounding dexterity by the Gauchos. Of the Indians, who are chiefly of Araucanian descent, by far the larger number are independent and live in separate tribes, governed each by its cacique. They dwell in tents of hides, and their subsistence consists mainly of maize, which they procure from the whites in exchange for cattle, salt, and blankets made by their women, and of the flesh of mares, these animals never being ridden, but wholly reserved for food. Some Indians are employed as farm laborers. As early as the 16th century missions were established to the east of Corrientes by the Jesuits, who did much toward civilizing the Indians; but after the expulsion of the order from South America, near the close of the 18th century, the natives relapsed gradually into savagism.—The coast line of the Argentine Republic, which measures 540 m., is generally low and sandy, and has no very good harbors. The principal port, Buenos Ayres, on the Plata, is 180 m. from the sea, and is difficult of access on account of the shallowness of the river. The only other important ports are Rosario, on the same river, 360 m., and San Nicolás, 310 m. from the sea, and Bahia Blanca and El Carmen on the seaboard. The northern and Andine provinces are for the most part mountainous, being covered with spurs diverging from the Chilian Cordillera. There are no volcanoes in activity; but signs exist of some extinct, such as that in the vicinity of Jujuy, from which issues every morning a spiral column of dust that extends many miles over the country. The town of Oran, in Jujuy, was overthrown by an earthquake early in 1872. Some peaks of the Despoblado chain in Salta attain a height of 14,000 ft.; and the culminating point of the Aconquija system, traversing Tucuman and Catamarca, reaches 17,000 ft. at its highest summit. The Córdoba chain, in the province of that name, is divided into two branches, but presents no lofty peaks. Among the mountains of the eastern provinces, the Yerbales in the N. E. of Corrientes are worthy of mention; and the southern portion of Entre-Rios is bisected by hills of considerable height. With these exceptions, and those of the Volcan, Ventana, and Guaminí ranges in the S. E. of Buenos Ayres, this country may be regarded as a vast unbroken plain stretching from the foot of the Andes to the Atlantic and the river Uruguay, and from the Bolivian boundary to the frontier of Patagonia. This plain may be considered as forming two grand regions: one, from the Rio Negro to the Rio Salado, comprises the pampas; the other, N. of the Salado and W. of the Paraguay, embraces the desert of the Gran Chaco, which extends, with little interruption, far N. of the Bolivian limits. The vast tract of the pampas, over 300,000 sq. m. in area, is itself distinguishable into several subdivisions, differing in climate and products, although under the same parallel. Proceeding from Buenos Ayres, the first of these sub-regions presents for nearly 200 m. an alternate growth of clover and thistles; the next a covering of long grass and brilliant flowers, extending without a weed some 400 m. further westward; the third, reaching to the base of the Andes, one continuous grove of shrubs and small evergreen trees, so evenly set that a horseman may gallop at random between them without inconvenience. Change of season brings little variation in the aspect of the two regions last mentioned; but in the first remarkable mutations occur. During the winter months the thistles and clover are exceedingly rich and strong, and herds of wild cattle are seen browsing in every direction. On the approach of spring the clover disappears, and nothing is distinguishable save an immense forest of giant thistles, tall enough to almost totally obstruct the view, and so closely set and so strong as to form an impenetrable barrier. In summer the thistles give place to a new and luxuriant growth of clover. The Gran Chaco is a vast and for the most part unexplored territory, the interior of which is exclusively inhabited by five nomadic tribes, distinct in language, but similar in physical appearance. The southern portion forms an immense desert interspersed with sand pools; the eastern, extensive plains and marshes, with here and there tracts entirely inundated, while the natural features of the northern part are plains of magnificent pasture, dense forests of useful timber, and numerous rivers and lagoons. Some colonies have been founded of late years and bid fair to prosper. The government offers liberal grants of land to settlers.—The Rio de la Plata, with the immense streams which form it, is one of the greatest, and certainly one of the longest, rivers of the western hemisphere. The traveller can take steamer at Montevideo and ascend without interruption to Cuyabá, in Matto Grasso, over 2,000 m. But it is itself rather a vast estuary collecting the waters of large rivers, and pouring into the Atlantic an immense and turbid flood, which is perceptible more than 100 m. to seaward, and produces a powerful current amid the waters of the ocean to a distance of 200 m. The depth of the Plata is nowise proportionate to its width. At Montevideo, where the width is 75 m., a series of sand banks narrow the channels and render them of difficult navigation; and at Buenos Ayres, where the shores are 28 m. apart, even vessels of medium draft have to anchor 6 and sometimes 8 or 9 m. from land. Up to 1855 passengers and goods were brought ashore in carts mounted on huge wheels, that went out to meet the boats at a distance of two or three cables' length from the water's edge. In that year two handsome piers 1,300 and 1,950 ft. in length were constructed of wood and iron; but when the river is low the old expedient of carts has to be resorted to. Of the two great rivers which unite to form the Plata, the Paraná curves from S. to W. on the N. E. border to its junction with the Paraguay, at Tres Bocas, in lat. 27° 14′ S., lon. 58° 30′ W., whence it flows nearly S. to Rosario, in lat. 33°, then turns S. E., and falls into the Plata by several channels from 25 to 55 m. above Buenos Ayres. The river is navigable for the largest vessels to its junction with the Paraguay, 850 m.; 150 m. higher for small steamers; and 350 m. further up for small boats. Its chief tributaries in the republic are the Salado, which flows S. E. from the N. W. part of the province of Salta about 600 m., and empties below Santa Fé, and the Tercero, which flows S. E., receives the Cuarto, and empties about 30 m. above Rosario. The Salado is said to be navigable from the plains of Salta. The Uruguay forms nearly the whole E. boundary of the republic, bordering on the provinces of Entre-Rios and Corrientes, to its embouchure in the Plata by a channel 6 m. wide. This river is usually flooded from June to November, and is navigable for steamers up to Salto Grande, about 200 m. The Paraguay, after a long course through Brazil and on the frontier of Bolivia, forms the dividing line between the Argentine Republic and Paraguay for 350 m. to its confluence with the Paraná, 25 m. above Corrientes, receiving in that distance the Pilcomayo and Bermejo. These are both large rivers flowing S. E. through the Gran Chaco, but the former is too shallow for navigation, while the latter has been navigated by steamers for 1,200 m. by its tortuous course. The Colorado or Mendoza, formed by the union of various streams springing from the volcanoes of the Chilian Cordillera, holds a generally S. E. course and flows into the Atlantic at Union bay. It is navigable for upward of 100 m. from the sea. There is a second Rio Salado in the province of Buenos Ayres, S. of the capital, but it is dry for most of the year. The Negro, which forms the S. boundary of the republic as far W. as lon. 70°, falls into the Atlantic below El Carmen, and has been navigated almost throughout its entire course, or about 500 m. The pampæan plains are drained by innumerable streams, some of considerable volume, whose waters, for the most part saline, spread and are lost in the marshes or salt lakes that abound in those regions. Among them the Primero and Segundo are large but not permanent streams; while the Tercero and Cuarto, already mentioned, are perennial. The plains are interspersed with an infinite number of lakes and lagoons, for the most part salt W. of the Paraná and Paraguay, while those E. of these rivers are without exception fresh. In the province of Corrientes is an extensive lake, the Iberá, 130 m. long and 90 m. wide, which gives its name to a marshy territory of considerable area. The Paraná is by some geologists supposed to have at an early period taken its course through this lake; and many are of opinion that the latter is now filled by infiltration from the great river, although there exists no visible connection between them. No rivers run into it, but it supplies four of some magnitude. The Iberá during the season of the floods extends over an estimated area of 1,000 sq. m., but is navigable only for canoes. The chief permanent lake of the republic is the Guanacache, in the province of Mendoza. There are also the Bevedero and the Urre Laguen, or bitter lake, both of some magnitude. The countless smaller lakes or lagoons usually disappear as soon as the rains have ceased, and leave the ground covered with a salt efflorescence to a depth of several inches, and in some places even of three feet.—The geological features of the regions N. of the Plata present a striking contrast with those on the south. The former are elevated, and composed of granite, gneiss, and clay slate; and indeed all the rocks showing themselves above the plain of the Plata, in the Sierra Ventana S. of Buenos Ayres, in Entre-Rios, Córdoba, and the upper provinces generally, are granitic, a superposition of pure white quartz rock associated with glossy clay slate occurring, however, over the granite of the Ventana. On the S. side of the Plata all rock formations disappear, and not even a pebble is to be found for hundreds of miles inland. The pampaean regions are characterized by a diluvial formation consisting of calcareo-argillaceous conglomerate gradually deposited during the lapse of ages, in what was once an arm of the Atlantic, but is now dwindled within the present limits of the estuary of the Plata. It may be observed that this same deposition is still rapidly progressing in the bed of the river, insomuch that it is altogether likely that the great stream which, according to report, was navigable for ships of the heaviest burthen three centuries ago, will in the course of ages flow into the ocean by a delta, like the Nile or the Ganges, instead of entering it, as it now does, through a single mouth. In Entre-Rios there occur at the bottom of the cliffs beds containing sharks' teeth and sea shells of extinct species, passing above into an indurated marl, and from that into the red clayey earth of the pampas, with its calcareous concretions and the bones of terrestrial quadrupeds, clearly telling of a large bay of pure salt water, gradually encroached on, and at last converted into a muddy estuary into which floating carcasses were swept. The number of the fossil remains imbedded in the grand estuary deposit, says Darwin, must be extraordinarily great. A line drawn in any direction through these regions would, observes the same writer, cut through some skeleton or bones. Fossil mammalia of nine species have been found: the *megatherium*, of huge dimensions; the *megalonyx* and *scelidotherium*, the latter edentate and probably as large as a rhinoceros, and both allied to the first; the *mylodon Darwinii*, and another gigantic edentate quadruped; a large animal with an osseous coat in compartments, bearing some resemblance to the armadillo; an extinct kind of horse, the *equus curvidens*, indicative of the existence and disappearance of a native race before the introduction of the few individuals by the Spanish colonists; a pachydermatous animal, perhaps the same with the *macrauchenia;* and the *toxodon*, an elephant in size, a gnawer by the structure of the teeth, and probably aquatic like the manatee, to which it is allied.—The Aconquija mountain chain abounds in gold, silver, and copper ores; and the Famatina in La Rioja affords very fine silver ores. Iron has been found in the Gran Chaco. An immense mass of this metal, presented by Sir W. Parish to the British museum, and pronounced to be of meteoric origin, is regarded by him as a genuine production of the soil. Salt, the most abundant mineral in the Argentine Republic, exists in a state of efflorescence covering immense tracts, and in countless brackish springs and pools; but nowhere is it so common as near Bahia Blanca. The salt occurring far inland consists for the most part of sulphate of soda, and perhaps 7 per cent. of common salt, and does not preserve meat well; while near the coast the proportion of common salt reaches 37 per cent., and the quality is superior. There are besides mines of rock salt in the country; and sulphate of soda and sulphate of magnesia, from which the magnesia of commerce is prepared, occur in various localities. Coal is found in the N. W. provinces, also gypsum, limestone, alum, mineral pitch, bituminous shale, and large quantities of sulphur; and there are extensive coal beds in the extreme S. W. angle of the country. —The climate, on the whole perhaps one of the finest in the world, exhibits nevertheless considerable variety. In the north the heat is great, and in some localities oppressive, save where tempered by fresh breezes from the Andes. On travelling southward a cooler temperature is experienced, and especially in the province of Buenos Ayres, where the climate closely resembles that of some portions of southern Europe. In the plains reaching from the Andes to the banks of the Paraná there is a great deficiency of moisture, while the countries E. of that river are refreshed by abundant and frequent rains. In Buenos Ayres, where a luxuriant vegetation shows great humidity, the climate is chiefly governed by the wind, a change of which not infrequently brings an alteration of from 20° to 30° in the thermometer, which rarely rises above 90° in the shade. The prevailing winds are northerly, and these, passing over extensive marshy and saline districts, produce on reaching Buenos Ayres a universal dampness, and upon the bodily system an extreme lassitude, inducing a liability to all the maladies consequent upon checked perspiration. Although the northers are not generally regarded as unfavorable to health if the necessary precautions are taken, while they prevail the most trifling wound or hurt may terminate in lockjaw. The S. W. wind, or *pampero*, usually follows the norther, and blows at times with great violence, driving back the waters of the Plata miles from the shore, and bearing clouds of dust so dense as to produce total darkness. The pamperos very frequently end in a heavy shower of rain, or rather mud, formed by the mingling of the water and the dust. The thunder and lightning during one of these storms are perhaps unequalled in any other part of the world. A disease called *el mal de siete dias* (the seven days' sickness), mainly prevalent among the lower classes, carries off an immense number of infants in the first week after birth. The following table shows the range of Fahrenheit's thermometer in the shade at Rosario during the month of March, and at Buenos Ayres from April to September:

	March.	April.	May.	June.	July.	August.	Sept.
Monthly range........ ...	51°	26°	25°	28°	26°	25°	18°
Greatest diurnal range....	48	24	18	21	14	14	9
Average do. do.....	20	10	9	7	9	7	5
Highest maximum.......	98	77	71	72	65	66	68
Lowest do.	68	57	55	49	48	49	52
Average do.	80	68	63	59	54	58	58
Highest minimum........	77	67	61	62	50	61	59
Lowest do.	47	51	46	44	39	41	45
Average do.	64	58	54	51	44	51	53
Mean averages...........	72	68	59	55	49	54	56

—The soil of the Argentine Republic is extremely varied and productive, save in the S. plains, the coarse shingle of which is unfavorable to vegetation. As has already been seen, the pampas, and principally to the S. W. of the Paraná, afford rich and abundant pasturage. The E. flank of the Andes and the banks of the W. affluents of the Paraguay are clothed with dense forests, the timber of which is, however, unavailable owing to its distance from the sea. The trees are mostly of the mimosa family; and with the fruit of the algarroba, mixed with maize, the Indians make a sort of bread, while by fermentation they produce the *chica*, an intoxicating liquor. In Salta the cinchona, various palms, and the *maté* or Paraguay tea are indigenous; and in Salta and Santiago the *cactus foliosus*, on which a cochineal insect feeds, grows to an enormous size. Aloes are very abundant, and from their fibrous materials the Indians manufacture nets, ropes, bags, &c., which they dye with indelible colors of their own preparation from native plants. The coca plant grows plentifully in Salta. Mixed with lime, the Peruvians chew it as a stimulant. Indigo is found in Corrientes, and also the shrub which nourishes the *clavillo*, an insect famed for the rich green dye it affords. The apple tree was introduced from Chili by the Indians, and forms veritable forests in the S. W. districts near the Andes. Figs, oranges, walnuts, and other fruits are common; and the peach tree is so abundant as to afford the principal firewood for the city of Buenos Ayres. Good wine is made in Mendoza. The sugar cane prospers in the northwest, and tobacco is extensively cultivated. The cotton tree flourishes in Catamarca, and red pepper is sent in large quantities to Buenos Ayres. Maize, potatoes, and the different European cereals are raised in almost all the provinces, and of wheat prodigious crops are produced, principally for export. But the exportation of productions of the soil has hitherto been inconsiderable compared to that of animal produce derived from the herds of cattle and horses in the pampas. An idea of the cattle-raising in eight of the provinces (there being no returns from the others) may be formed from the following statistics of the farming stock in 1866:

PROVINCES.	Horned Cattle.	Horses.	Asses and Mules.	Sheep.	Goats.	Swine.
Buenos Ayres..............................	6,000,000	1,800,000	80,000	60,000,000	5,000	115,000
Entre-Rios..............................	2,500,000	600,000	7,500	6,000,000	....	....
Corrientes..............................	2,000,000	375,000	60,000	1,000,000	10,000	4,500
Catamarca..............................	185,000	40,000	40,000	80,000	121,000	2,500
Mendoza..............................	210,000	71,000	7,500	230,000	70,000	8,500
Salta	255,000	50,000	50,000	150,000	95,000	2,500
San Luis..............................	300,000	96,000	14,000	160,000	285,000	....
Tucuman..............................	275,000	85,000	22,000	95,000	25,000	....

—In the forests of the republic there are jaguars, cougars or pumas (American lions), ant-eaters, and chinchillas as large as squirrels and much prized for the beauty of their furs. The tapir is common in the north. Deer abound in the pampas, as do wild dogs and armadillos; and there are three species of partridge. On the banks of the Rio de la Plata is found the *cariguеibaju*, known in commerce by its fur under the name of nutria; it is a carnivorous animal, of the size of a cat, web-footed, and its flesh is considered exceedingly delicate. The capybara, the giant of the rodentia, and the carpincho frequent the rivers. The Andine provinces abound in guanacos, llamas, and vicuñas; and the Gran Chaco is infested by the various feline animals already mentioned, besides wild cats, boars, myriads of noxious insects, spiders of monstrous proportions, enormous mosquitoes, and innumerable swarms of bees. Several varieties of venomous snakes are met with, especially a *trigonocephalus*, the fiercest and most hideous of its kind, and a species of boa similar to the *traga-venado* or deer-swallower of Venezuela. The tocutuco and bizcacha, rodent quadrupeds, are found in all directions throughout the pampas, rendering travelling dangerous from their burrowings. Condors, gallinazos, vultures, and other predacious birds abound in various districts; and the woods are peopled by numerous smaller birds of endlessly varied plumage. The rivers, and especially the Rio Negro, abound in fish of all kinds, the lamprey, trout, pejerey, sole, and ray or skate being those most prized. Seals are taken on the N. coast, as also sea lions and sea elephants; the latter often attain a length of 20 to 28 feet, and one will yield two hogsheads of oil. The breeding of mules has of late years declined, though considerable droves are still to be met with in the *estancias*. The sheep, although extremely numerous, are, like the goats and hogs, of an inferior breed. A species of ostrich, smaller than that of Africa, is common on the plains, and hunted for its feathers, an article of export of some importance.—Almost the only manufactures of the Plata provinces are ponchos, saddle-cloths, ropes, &c., made by the Indians, and morocco leather, wooden bowls, and dishes from Córdoba, the principal manufacturing town.—In spite of wars, epidemics, droughts, and other obstacles to the material development of the country, the following tabular statement by Sr. Don Manuel R. García, Argentine minister to the United States, shows that the exports have quadrupled in quantity and quintupled in amount in the 17 years from 1853 to 1870:

ARTICLES.	1853.	1870.
Salted ox hides	43,881	774,806
Dried ox hides	604,868	1,824,895
Horse hides	129,905	102,259
Hogsheads of tallow	17,663	108,884
Packages of wool	20,514	160,869
Sheepskins	1,898	67,234
Quintals of jerked beef	275,000	647,582
Total (tons)	97,453	897,723
Value	$6,990,770	$39,294,690

This increase, large as it may appear, belongs to a small proportion only of the products of the country, the mineral and agricultural resources of which have not yet been developed, for want of hands, capital, and suitable roads. Official reports show the exports of the products of cattle to have been in the proportion of $22 50 for each inhabitant in the province of Buenos Ayres alone in 1853, $60 in 1860, and $80 in 1870. The wool clip for 1866 was estimated at 100,000,000 lbs. The export duties on wool, bones, hides, and tallow amount to about 3,000,000 silver dollars per annum. The total of the exports from the port of Buenos Ayres to the United States during the year ending Sept. 30, 1870, was $6,473,927 61; while that of the imports from the United States in the same period was but $2,087,999, according to custom house returns. The balance of trade from Great Britain was in favor of the latter by over $6,000,000, and that with France by about $1,500,000. The imports mainly comprise cotton, woollen, and linen fabrics, machinery, coal, and iron. In 1869 there entered the principal ports 1,337 sailing vessels, with an aggregate of 401,070 tons, and 1,158 steamers; and there cleared 970 sailing vessels, with a total of 308,325 tons, and 1,158 steamers.—The highways of the republic are, with few exceptions, as nature made them, consisting merely of a beaten track across the pampas. There are four lines of railway in the province of Buenos Ayres. In Entre-Rios there is also easy communication by river steamboats; but in the interior of Corrientes travelling is done exclusively on horseback. There are now (1872) six railway lines opened for traffic, four of which diverge from the capital of the republic in different directions; the remaining two are from Rosario to Córdoba, and from Gualeguay to Puerto Ruiz. Besides these, there are two railways in course of construction, and five others projected. Along the lines already opened, new farms have been established, immense quantities of wheat sown for exportation, and the shipment of wool has so increased as at times to task the carrying power of the railways. In September, 1871, there were 1,230 m. of telegraph open, and over 2,630 m. in process of construction. A submarine cable has been laid between Buenos Ayres and Montevideo, and an important line is projected to unite the capitals of Chili and of the Plate provinces.—The Mauá bank was the first private bank established in Buenos Ayres (1858); the London and River Plate bank, established in 1863, does a large and remunerative business. The Argentine bank is of more recent date.—The business of the post office department has greatly increased in a few years; the number of letters passing through the Buenos Ayres post office in 1859 was but 400,000; in 1865 it amounted to 2,000,000.—The constitution of the Argentine Republic bears date May 15, 1853. The executive power resides in a president elected for six years by the representatives of the 14 provinces, 133 in number. The legislative authority is vested in a national congress, consisting of a senate numbering 28, two from each province, and a house of deputies, of 54 members. The vice president, elected in the same manner and at the same time as the president, is chairman of the senate, but has otherwise no political power. The president is commander-in-chief of the army, and appoints to all civil, military, and judicial offices; but he and his ministers are responsible for their acts, and liable to impeachment. There are five ministerial departments: interior, foreign affairs, finance, war and marine, and education and public worship. The governors of the provinces are elected by the people for a term of three years. The army of the republic consists, exclusive of the militia and national guard of Buenos Ayres (numbering 19,867 men), of 6,482 men—2,909 infantry, 2,861 horse, and 712 artillery; there are 29 generals, 273 commandants, and 632 subaltern officers. The militia and national guard may be called out in time of war. The navy comprises seven vessels of war, one of which mounts 12 guns. The public revenue is mainly derived from customs duties, which average 25 per cent. on imports and 10 per cent. on exports. The national expenditure is made up chiefly of the cost of the army and navy, and the interest of the public debt. The expenditure was considerably increased from 1867 to 1870, owing to the war with Paraguay. The official estimates of revenue and expenditure for the financial year 1869-'70, presented to the national congress, were as follows:

REVENUE.

Import duties	$8,400,000
Additional 5 per cent. (war)	2,100,000
Export duties	1,500,000
Additional 2 per cent. (war)	500.000
Storage	260.000
Stamp duty	155,000
Post office	105,000
Interest on 17,000 shares of Argentine Central railway, at 7 per cent	116.920
Sundries	50,000
Total	$13,186,920

EXPENDITURE.

Ministry of the Interior	$1,297,985
" Foreign Affairs	111,400
" Finance	8,452,725
" Public Instruction	768.270
" War	3,757,215
Total	$14,387,595

The budget for 1870–'71, voted by the national congress, showed an estimated revenue of $15,800,000, and an estimated expenditure of $16,000,000, leaving a deficit of $200,000. The public debt, divided into an external and an internal debt, was as follows at the end of October, 1871:

EXTERNAL.

Old Buenos Ayres debt, 6 per cent. stock	$4,529,000
" " " " 8 " "	5,554,500
Loan authorized by act of congress May 27, 1865,	12,500,000
" " " " October, 1870,	30,612,000
Total external debt	$53,195,500

INTERNAL.

Consolidated 6 per cent. Argentine stock	$12,839,500
Buenos Ayres public stock in paper currency	2,984,940
Paraná debt, 1858, including interest	2,166.545
Obligations to foreign creditors	94,260
Loan from Brazilian government, 1851	1.142,705
" " " " 1865–'66	2.000,000
" authorized by congress October, 1869	3,000,000
Total internal debt	$24,227,950
Total debt	$77,423,450

The greater part of the foreign loan of 1865 was issued in 1868, to the amount of £1,950,000, at the price of 72½ for 100, by Messrs. Baring Brothers of London. It is at 6 per cent. interest, and payable in 21 years. The loan of 1870, amounting to £6,122,400, granted by congress for the construction of railways and other public works, was issued at the London exchange in April, 1871, at the price of 88½, to be redeemed by an accumulated sinking fund of 2½ per cent. Besides the liabilities above mentioned, there is a floating debt in treasury bills to an unknown amount. Each of the 14 provinces has a revenue of its own, derived from local taxes. The liabilities of all the provinces, except Buenos Ayres, the annual expenditure of which is about $2,000,000, are internal. That province contracted in June, 1870, a loan in England of £1,034,700, issued at 88, with 6 per cent. interest, to be redeemed at par in 33 years. In 1866 treasury notes were issued, bearing interest, for payment of government dues, and to be received in payment of customs duties. They represent silver dollars, and are of the denominations of $5, $10, $20, $50, and $100.—Much has been done of late years for the advancement of education, and in the chief towns it is better than in most parts of South America. There are at present 142 municipal and state schools in the province and city of Buenos Ayres, besides a large number of denominational and other private and Sunday schools in that, and a proportionate number in the other provinces. The capital and Córdoba have each a university, and Buenos Ayres and Corrientes have each a *colegio nacional*, the studies in which embrace the usual classic and scientific courses, besides modern languages, and degrees are conferred in theology, law, and medicine. New colleges are being founded in Entre-Rios; and normal schools will shortly be established in all the provinces. About 90,000 children attended school in the whole republic in 1871, and there were 1,884 students in the national colleges. There are extensive libraries, chief among which is the *biblioteca nacional*, founded in 1870 under the auspices of President Sarmiento.—The predominant religion is Roman Catholic; but all others are tolerated, and the ministers of some other denominations are paid by the government. In 1869 it was estimated that there were 10,000 Protestants among the English, Scotch, American, and German settlers.—The mouth of the Rio de la Plata was discovered in 1512 by Juan Diaz de Solis; and as early as 1535 Don Pedro de Mendoza began the settlement at Buenos Ayres, while the country as far N. as the site of Asuncion, the present capital of Paraguay, was explored by parties under his orders. Many colonies were founded in that century, and much progress was made in the civilization of the Indians under Don Juan de Garay, who was in 1580 appointed lieutenant governor of those provinces, which were then regarded as forming a part of the viceroyalty of Peru. In 1620 a new government was formed, having for its capital Buenos Ayres, hitherto dependent upon the government of Paraguay, and both continued under the viceroyalty of Peru till 1776, when the viceroyalty of Buenos Ayres was created, comprising the territories now known as Bolivia, Paraguay, Uruguay, and the Argentine Republic. In 1806 Buenos Ayres and Montevideo were captured by a small British force, which, however, was soon compelled by the bravery of the inhabitants to relinquish the conquest. An attempt was made in August, 1807, by a British army 10,000 strong, to reconquer the city of Buenos Ayres; but the invaders were defeated. Gen. Whitelock, who commanded the attack, was on his return to England cashiered for incapacity. The struggle for independence was begun about three years later, and was waged on both banks of the Plata, until the only remaining Spanish forces surrendered in Montevideo in 1812. During this period the war of independence was also going on in Upper Peru (Bolivia) with varied results, and in the adjacent provinces, the Spaniards suffering considerable reverses in Salta and Tucuman. In

January, 1813, the chief power was vested in the "Sovereign Assembly" formed in Tucuman, then the seat of government. About the same time Gen. José de San Martin, the governor of the province of Mendoza, conceived the project of crossing the Andes for the purpose of driving the Spaniards out of Chili. The enterprise proved successful, and Chili was freed after the memorable battles of Chacabuco and Maipú (1817-'18). Immediately afterward the Chilians and Argentines carried their united arms into Peru, and entered Lima in 1821. The Portuguese in 1816, under pretext of putting down anarchical movements set on foot in Uruguay by Artigas, descended into that territory and took possession of Montevideo, in spite of the protests of the Argentine government, then too busily engaged in preserving order at home and in carrying on the war of independence, to enter openly into hostilities against the invaders. The same year the independence of the United Provinces of La Plata was declared in Tucuman (July 9), in which city, after the dissolution of the sovereign assembly, a congress had assembled March 26, 1817, and promulgated a provisional constitution, Gen. Puyerredon being named supreme dictator. The seat of congress was afterward removed to Buenos Ayres, in the hope of securing greater liberty of action; but in 1820 the directory fell, and in the following year a democratic form of government was established. The administration was composed of Gen. Rodriguez and two secretaries, Don Bernardino Rivadavia and Don Manuel García. The riverine provinces soon united themselves with Buenos Ayres, and this alliance led in 1824 to the organization of the republic, under the administration of Las Heras. Brazil forced the United Provinces into a declaration of war, and blockaded the city of Buenos Ayres, January, 1826; and, though the Argentine arms were for a time victorious by sea and land, the event served to prove the weakness of the union. It is important to remember that the size of the different provinces was extremely various, and that the character and interests of the population were no less varied. It may also be added that the difficulty of establishing communication between the provinces rendered useless at times prudent measures taken by the central government. There was almost a feudal aristocracy in the north; in the wide ranges of the pastures the herdsmen felt and exercised a rude power; but there was a greater degree of moderation in the agricultural states. Buenos Ayres, as the only seaboard state, and as much the richest, naturally took the lead, both in preparing the way for independence and in forming the confederacy. The higher classes possessed immense landed and other property. Many of them had been educated in Europe, and had introduced into South America the refinements of a high civilization, and hoped to extend those refinements over the whole country by means of a form of government. But under their ideas this government was to be wielded by the rich and educated classes. Their party, the Unitarios, succeeded in framing the constitution of 1825, under which the nation was represented by a small aristocracy. Rivadavia was the first and only president of the confederation under this constitution. The greater part of the large province of Buenos Ayres took its political bias from the independent and republican tone of the cattle drivers and herdsmen, who knew their power, and were not averse to asserting it. They soon found a leader in Juan Manuel de Rosas, who was descended from a noble family of Spain. Untutored in the arts of refinement, and at once daring in the highest degree, ambitious, and cunning, he soon found numerous supporters among the masses of the people, and especially after he had succeeded in extending the limits of the province of Buenos Ayres, by subduing the savages of the pampas and other indigenous tribes, who were implacable enemies of the *gauchos* or herdsmen. No sooner had he espoused the cause of the federalists than his popularity spread to the provinces, and he gained the sympathies of many prominent personages who regarded with a jealous eye the recent excesses of military power. He had opposed the Unitarios at the time of the union, although unsuccessfully; but by 1827 he had acquired sufficient influence, and found himself certain of the aid of other popular chieftains, such as Bustos, governor of Córdoba, Ibarra, commandant of Santiago, Quiroga, of La Rioja, and Lopez, of Santa Fé. They protested against the constitution and government of 1825, and took up arms in force in support of their protest. Rivadavia, successor to Las Heras, seeing himself powerless to establish a unitarian constitution, and aware that he could neither carry on the war against the Brazilians nor obtain a peace, resigned power, and Rosas and his colleagues chose Dorrego governor of Buenos Ayres. Dorrego made a treaty of peace with Brazil, through the mediation of England, in 1828, from which year dates the recognition of the Banda Oriental of Uruguay as an independent state, under the triple guaranty of Great Britain, the Argentine Republic, and Brazil. A confederation, based upon voluntary alliance was formed in January, 1831, between the provinces of Buenos Ayres, Corrientes, Entre-Rios, and Santa Fé, which were soon joined by the other provinces. But some of the officers who had commanded in the late war now began to regard with distrust the triumph of federal principles under Dorrego and the other governors; and the established army of the republic set on foot a counter-revolution, headed by one Lavalle, an officer of some distinction. Lavalle defeated Dorrego and Rosas, and shot the former without a trial. Rosas, however, with Quiroga of La Rioja and Lopez of Santa Fé, formed a new league and overthrew Lavalle, who resigned his post, Rosas being chosen in his place, which he held till 1832. Two governments, the first under Balcarce, and the second under Viamont, now followed each other in the space of a few months, neither being able to maintain itself, as Rosas held the army under his control. After the fall of Viamont, Rosas was reëlected governor of Buenos Ayres, a position which placed him at the head of the foreign relations of the country, and gave him a very general control of its internal affairs. His term expired in 1835, when he refused to be again a candidate. Five times the honor was tendered to him, and as often refused. He was then offered the dictatorship for five years, which he accepted, and the appointment was twice renewed. He held the office till 1852, and was the sole and uncontrolled ruler of Buenos Ayres, and practically of the Argentine Republic, during the whole of that time. From 1827 to 1852 there was no meeting of the national congress or constituent assembly. It is difficult to characterize precisely the use which he made of these unlimited powers. He has been represented as an arbitrary and bloody tyrant, and accused of the treacherous murder of all the friends who placed him in power. He certainly ruled with a strong hand, and was neither slow nor scrupulous in his means of defending or of advancing himself; but he maintained a government under which his country increased in population and material prosperity, notwithstanding continual internal dissensions and foreign wars, and retained a strong and generally triumphant party of friends till the last. With the idea that all the provinces of the former viceroyalty of Buenos Ayres belonged to the Argentine Republic, a contest was long kept up to attempt to bring into it the states of Paraguay and Uruguay. The former, protected in part by its natural position, and more by the policy of isolation and the strong executive power of its singular dictator, Francia, almost entirely escaped foreign conflict. But Brazil had ever in view the conquest of the latter, while the Argentine government saw the importance of that territory, and especially the necessity of checking the ambition of the neighboring monarchy. The civil dissensions in the Banda Oriental exercised a marked influence on Argentine politics, and the movements headed by Oribe and Rivera served Rosas as a pretext for his intervention in Uruguayan affairs and for the aid given by Brazil to the enemies of the Argentine dictator. Oribe was a partisan if not a creature and tool of Rosas. To him there was opposed a strong faction led by Rivera, a man who had raised himself to influence much in the manner employed by Rosas in Buenos Ayres. The matter came to a war, first of blockades and then of armies, between Oribe supported by Rosas on the one hand, and Rivera sustained by the Argentine exiles in Montevideo, and also by a French fleet, on the other. The intervention of the French was induced by a quarrel which had arisen between a French vice consul and the dictator. The French difficulty was settled by the appointment of a new consul, and in 1840 peace was concluded between the confederation and Montevideo. This peace was not of long duration, and in 1845 Great Britain and France, at the special request of the emperor of Brazil, interfered, on the plea of enforcing the treaties of 1828 and 1840. The allies blockaded Buenos Ayres; seized the Argentine fleet, then engaged in blockading Montevideo, and the island of Martin García, which commands the entrances of the Paraná and Uruguay; opened the Paraná, which Rosas had closed to vessels bound to Paraguay, and offered convoys as far as Corrientes, where in repeated attempts by the dictator to oppose the passage of the combined fleets the Argentines sustained heavy losses. This state of things lasted three years, at the end of which period England withdrew (July, 1848), but France continued hostilities six months longer. The rival factions in Uruguay, one of which was supported by Brazil and the other by Rosas, occupied the latter many years, while the opposition party in his own state was gradually becoming too powerful for him. This party, headed by Urquiza, governor of Entre-Rios, was now armed and acting in conjunction with the natural enemy, and at the battle of Monte Caseros, Feb. 3, 1852, Rosas was defeated; but, more fortunate than Dorrego had been, he was enabled to escape to England. Vicente Lopez now became provisional governor of the province of Buenos Ayres. But, by a sudden *coup d'état*, Urquiza, having the army at his disposal, put himself at the head of the government as dictator, not five months after the deposition of Rosas. The first use of his power was to acknowledge the independence of Paraguay. He also secured the future free navigation of all the rivers flowing into the Plata, a wise measure which still remains in force. But this new assumption of dictatorial power produced immediate irritation. Having to attend congress at Santa Fé, he had hardly left the capital when (Sept. 11, 1852) a revolution broke out, and Valentine Alsina was chosen governor of Buenos Ayres. The province of Buenos Ayres, with this government, determined to maintain itself as a state independent of the confederation, and another revolution in December, which temporarily changed the governor, did not alter this purpose. The congress of the confederation did not assemble till Nov. 20, all the states being then represented except Buenos Ayres, and Urquiza was instructed to suppress the rebellion in that state. It again met Jan. 22, 1853, and went on with the work of forming a constitution. It also recommended the president to take all means to stop the civil war and bring Buenos Ayres back to the confederacy. The new constitution of the confederation, which is still in force, was promulgated May 1, 1853. It was framed in the apparent expectation that Buenos Ayres, the richest and most important, as the only maritime state of the confederacy, might be induced to return to it, and accordingly fixed that city as the capital. The constitution, with some slight modification, was copied from that of the United States of North America, as being a federal government of independent states. It guarantees the free navigation of the rivers, and provides that there shall be no duties on goods carried from province to province; grants to foreigners all civil rights; provides for their naturalization after ten years' residence, which term may be abridged at the discretion of congress; and makes other provisions for the encouragement of immigration. It went into effect at the end of the year. Urquiza was chosen president for six years from March 5, 1854. The seat of government was established at Bajada del Paraná, in the province of Entre-Rios. Meantime, in Buenos Ayres a new constitution had also been formed in January of the same year, but not without a hope expressed and provision made for a future return to the confederation, which soon after seemed probable. That province was invaded by a party of filibusters under one Costa, and Urquiza was suspected, or at least accused, of having fostered the movement. This he promptly denied, and sent his forces to help to repel them; which friendly act failed to bring about an entire reconciliation, but resulted in good will between the parties, and two treaties of peace signed at Buenos Ayres, Dec. 20, 1854, and Paraná, Jan. 8, 1855. They provided for independent governments, but contained stipulations for much mutual assistance. Urquiza continued president of the Argentine Confederation, and Pastor Obligado was reëlected governor of Buenos Ayres for a term of years. Upon the unanimous request of the congress of the confederation, negotiations were reopened on the subject of reunion, Oct. 10, 1855, and Juan Bautista Peña was sent to Paraná for the purpose. But the discovery that his authority did not extend to merging the two sovereignties, produced much irritation in the confederation, at the same time that another event occasioned discontent at Buenos Ayres. On Dec. 24, 1855, some Argentine refugees from Montevideo, under Gen. Flores, disembarked at Santa Fé to invade the province of Buenos Ayres. Gen. Bartolomé Mitre repulsed them, and in his turn invaded the province of Santa Fé, in which step he was sustained by his government. Upon this, not only was the mission of Peña closed, but the Argentine government signified to him (March 18, 1856) that the treaties of Dec. 20, 1854, and Jan. 8, 1855, were annulled. Differential duties levied by Urquiza upon all vessels from Buenos Ayres bound up the Plata and its tributaries gave rise to serious hostilities, which were renewed at intervals during four years, until Nov. 11, 1859, when Buenos Ayres was reunited to the republic. In 1860 Urquiza was succeeded in the presidency by Dr. Santiago Derqui; and in the following year the exclusion of the deputies of Buenos Ayres from congress, on the ground of unconstitutional election, led to the renewal of hostilities. Gen. Bartolomé Mitre of Buenos Ayres defeated the Argentine troops at Pavon (Sept. 17, 1861), and was provisionally intrusted with the government, Derqui having abdicated. A convention appointed to revise the old constitution adopted a new one, appointing Buenos Ayres provisional capital of the republic, being at the same time the state capital. In October, 1862, Mitre was elected president of the Argentine Republic. Urquiza in the mean time remained on the defensive in Entre-Rios, but was soon induced to accept the government of that province, which had entered into the newly constituted republic. An insurrection headed by Gen. Peñalosa, who for nearly two years held the provinces of Catamarca, San Juan, and Córdoba, terminated in his capture and execution (1863). In 1864 N. Aguirre was elected president of the Banda Oriental del Uruguay, from the ranks of the *blancos* (whites) or reactionary party; and Venancio Flores, the chief of the *colorados* (reds) or liberal party and the unsuccessful candidate for the presidency, placed himself at the head of an insurrection and readily obtained the aid of Brazil, in spite of the repeated protest of Lopez, president of Paraguay, to the government of Rio de Janeiro. Lopez now ordered the capture of a Brazilian steamer on its passage up the river to the province of Matto Grosso, and the detention of the crew and passengers as prisoners of war, Nov. 11, 1864. In the following month a Paraguayan army invaded Matto Grosso, sacked Cuyabá, the capital, and five other towns, and took possession of the diamond mines. Aguirre had applied to Lopez for aid, which was at once promised; but the Paraguayan troops could only reach Uruguay by passing through the Argentine province of Corrientes, and Mitre refused them permission of transit. In 1864 Flores was elected and in 1865 assumed the functions of president, the city of Montevideo being occupied by Brazilian troops. Fearing now from the attitude of the Argentine Republic that it would join the alliance against him, Lopez seized two Argentine war vessels in the bay of Corrientes, April 13, 1865, and the next day that city was occupied by Paraguayan forces, who formed a provisional government composed of three Argentine citizens, and declared the provinces of Corrientes and Entre-Rios to be annexed to Paraguay. War was declared by the Argentine Republic against Paraguay April 16, a like declaration having been issued by the national congress of Paraguay against the Argentine Republic on the 18th of March. On May 1 an offensive and defensive alliance was secretly entered into between the Argentine Republic, Uruguay, and Brazil, against Paraguay, the allies "solemnly binding themselves not to lay down arms until the existing government of Paraguay should be overthrown." In June the city of Corrientes was recaptured by the Argentines, but was soon after again invested by the invaders. During the first two months the war was chiefly carried on in Corrientes, generally with heavy losses to the Paraguayans, who, however, had by August succeeded in taking one or two towns in the adjacent Brazilian province of Rio Grande do Sul. But their advancing army on the river Uruguay, numbering 7,000, was defeated at Yatay, and finally surrendered in Uruguayana to 10,000 Uruguayans and Argentines. In November following the Paraguayan army had evacuated the Argentine territory, and the close of December found the allies, 35,000 strong, at Corrales on the N. shore of Corrientes, ready to cross the Paraná and carry the war into the heart of Paraguay. Lopez, commanding in person, was unable to defend his frontiers, and retired northward before superior forces, fighting for every inch of ground. This obstinate defence terminated with the battle of Lomas Valentinas, Dec. 25-27, 1868, having lasted upward of three years. The war continued, however, until March 1, 1870, when Lopez was defeated and killed at Aquidaban. (See Paraguay.) In 1866, in some provinces, especially those bordering upon Paraguay and Bolivia, great dissatisfaction with the continuance of the triple alliance and the war had been expressed, and repeated attempts made to induce the separation of some of the northern provinces from the Argentine Republic; but these disturbances were easily put down. Bolivia, in the same year, protested against the treaty of alliance, asserting her right to a part of the Gran Chaco claimed in the treaty by the Argentine states. On Dec. 10 a convention to reform the constitution of the republic met at Santa Fé; the only important measure adopted was the renewal of the permission to congress to levy duties on exports. An insurrection headed by one Videla broke out in Mendoza, San Juan, and La Rioja, for the purpose of separating the interior provinces from the republic; it was put down in April, but the leaders escaped. The opposition to the war had been increasing in strength, and was vehemently expressed in 1868 by Alsina, governor of Buenos Ayres, who denounced the contest as barbarous, murderous, and fatal. A bill which passed congress in the same year to make Rosario the national capital was vetoed by President Mitre. In April, 1870, a formidable rebellion broke out in Entre Rios, headed by Gen. Lopez Jordan, the first act of which was to murder Gen. Urquiza, Jordan's father-in-law, sack his palace, and confiscate his property. Two of Urquiza's sons were murdered in Concordia; and Jordan, having forced the state assembly to appoint him governor, issued a proclamation of liberty, and appealed to the national government for immunity from punishment. It was not until April, 1871, that the national troops, after immense losses, succeeded in quelling this rebellion. In March, 1871, the city and neighborhood of Buenos Ayres were visited by yellow fever; all business was interrupted for several weeks, and the estimated mortality during the 100 days preceding the 30th of April was 26,000. Toward the close of the year a controversy arose between the Argentine Republic and Brazil, the former having protested against alleged breaches by the Brazilians of certain articles of the treaty of alliance of May 1, 1865. But Gen. Mitre brought his negotiations to a successful termination in October, 1872; and the Argentine government was to commence negotiations with Paraguay concerning boundaries before the end of the year.

ARGIVES (Gr. Ἀργεῖοι), the inhabitants of Argos or Argolis, in ancient Greece. During the Trojan war they were the most prominent among the Greek tribes, as Agamemnon, the Greek commander-in-chief, was an Argive. For this reason Homer, and following him some of the Roman poets, often use the name Argives as a generic appellation for all Greeks.

ARGOL. See Tartar.

ARGOLIS. See Argos.

ARGONAUT. See Nautilus.

ARGONAUTS, a name given from that of their ship, the Argo, to a band of heroes of Greek antiquity, who, according to the legend, first navigated unknown and dangerous seas. The poets have given different versions of the tradition, but the story generally accepted is briefly as follows. Jason, the son of Æson, was ordered by his uncle Pelias, king of Iolcus in Thessaly (who had been warned by the oracle to dread his nephew), to capture and bring to him the golden fleece of the ram which had carried Phrixus and Helle when they fled from their stepmother Ino. Phrixus had nailed the fleece to an oak in the grove of Mars in Colchis, where it was watched by a sleepless dragon. Joined by the principal heroes of Greece, whom he had invited to take part in the adventure, Jason set sail from Iolcus in the fifty-oared ship Argo, named from Argos, son of Phrixus, who had built it for the expedition. The heroes landed first in Lemnos, where the Lemnian women, who on account of the anger of Venus had slain their husbands, detained them two years. The Doliones, whom they next visited, at first received them hospitably, but afterward, mistaking them for Pelasgians, attacked them; and Jason in the battle killed their prince. In Mysia, their next landing place, Hylas, led away by a nymph, and Hercules and Polyphemus, who were searching for him, were left behind. In the land of the Bebryces King Amycus, who had challenged the heroes to a boxing match, was slain by Pollux. Continuing their voyage, they reached the Symplegades, two floating islands which crushed, in dashing against one another, whatever came in their way. Availing themselves of an artifice taught them by the seer Phineus and Juno, who acted as their pilot, they let loose a dove, only the tail of which was crushed by the colliding rocks, and the Argonauts passed safely between as the islands rebounded. The islands from this time ceased their dangerous movements. Reaching Colchis at last, the heroes sought the king, Æëtes, who promised the fleece to Jason on condition that he should yoke to the plough two fire-breathing bulls, and sow the dragon's teeth left by Cadmus in Thebes. Aided by the daughter of Æëtes, Medea, a powerful enchantress, who had fallen deeply in love with him, Jason accomplished these tasks; but finding Æëtes plotting treachery, the hero, again assisted by Medea's enchantments, seized the fleece, carried it on board his ship, and set sail, accompanied by Medea and her brother Absyrtus. Pursued by Æëtes, Medea killed Absyrtus, and, throwing his body piece by piece into the sea, delayed the king, who stopped to gather the remains of his son, while the Argonauts escaped. But the mast of the Argo, which was made of Dodonian oak having the gift of prophecy, told the heroes that for the crime against Absyrtus they were condemned to undergo innumerable difficulties on their homeward voyage. Having been absolved by the enchantress Circe, they escaped Scylla and Charybdis with the help of Thetis, eluded with the aid of Orpheus the enticements of the sirens, and after four months of continued danger reached Iolcus. The Argo was consecrated by Jason on the isthmus of Corinth to Neptune.

ARGONNE, a mountainous and wooded region of N. E. France, forming a part of French Lorraine and Champagne, extending along the rivers Meuse and Aisne nearly 47 m. from Sedan (Ardennes) to beyond Ste. Ménéhould (Marne). It is bounded N. by the Ardennes and S. by the Meuse mountains, and contains many forests and ranges with several almost inaccessible passes. W. Argonne, or the Argonne forest proper, a wooded elevation 800 to 900 ft. high, extends over 30 m., with a breadth varying from 1 to 8 m., from the sources of the Aisne, along that river and the Meuse northward as far as Chêne-Populeux, separating the fertile plains from the barren steppes between Vitry and Sézanne, familiarly called Champagne Pouilleuse. The forest of E. Argonne, 600 to 900 ft. high, including in the N. the forest of Apremont, 1,225 ft. high, runs parallel with W. Argonne along the E. bank of the Meuse. The forest of Argonne contains several defiles renowned in history, among them the battlefield of Valmy, and has therefore been called the French Thermopylæ. Several important military movements and actions took place within its limits during the Franco-German war of 1870, preceding the battle of Sedan.

ARGOON, or **Argun**, one of the two chief branches of the Amoor river. Under the name of Kerulun or Kerlon, it rises about 30 m. S. E. of the sources of the Onon, S. of the Kentei mountains in Mongolia, and runs N. N. E. through the N. part of the desert of Gobi, about 500 m., to Lake Kulon or Dalai Noor (holy lake). Thence, taking the name of Argoon, it flows generally N., with large bends, about 400 m., between the Russian and Chinese territories, to its junction with the Shilka, forming the Amoor. Its chief affluents are the Khailar, Khalkha, and Gasimoor, the latter running almost parallel with the Shilka.

ARGOS, or **Argolis** (anciently also *Argia* and *Argolice*), the N. E. part of the Peloponnesus, between the bays of Ægina and Nauplia, the Saronic and Argolic gulfs of the ancients. The eastern continuation of the northern mountain range of the peninsula surrounds a part of the inhabited shores, which bear marks of volcanic convulsions, and the plain of Argos, which is fertile, but rendered unhealthy by marshes. The chief mountain group is the Malevo, called by the ancients Artemision, on the Arcadian boundary, which rises above 5,000 feet. The largest plain is situated near the town of Argos, behind the bay of Nauplia, watered by the river Planitza, the classical Inachus. Only a few other spots are fit for agriculture, on account of the want of water, as all the streams except the Planitza and the Kephalari (anc. Erasinus) dry up. But the many bays render Argolis favorable for navigation. In the earlier times of antiquity Argolis was strictly the plain surrounded on the west by the Arcadian mountains, and on the north by those of Phlius, Cleonæ, and Corinth. In the Roman epoch Argolis represented the eastern part of the Peloponnesus, bounded, on the land side, N. by the territories of Sicyon and Corinth, W. by Arcadia, and S. by Laconia. Argolis belongs to the earliest cultivated regions in ancient Greece. From the remotest times it was divided into the kingdoms of Argos, Mycenæ, Tiryns, Trœzene, Hermione, and Epidaurus, which all afterward formed republics. About 750 B. C. the city of Argos, under Phidon, was the leading state of the Peloponnesus. Its power sank in its wars with Sparta, waged for the possession of the district of Cynuria, on their confines. Cynuria was lost about 550, and a defeat near Tiryns in 524 completed the decay of Argos. In the Peloponnesian war it sided with Athens. It early joined the Achæan league, and, on its fall, was included in the Roman province of Achaia.—In the present kingdom of Greece, Argolis is the main portion of a nomarchy called Argolis and Corinth, and embracing besides these territories a part of ancient Achaia and the islands of Spezzia and Hydra; area, about 1,900 sq. m.; pop. 128,000. Nauplia is the capital.—The town of Argos is situated near the head of the gulf of Nauplia, 20 m. S. S. W. of Corinth; pop. about 8,000. It suffered much in its capture by the Venetians in 1686, and its recapture by the Turks in 1706. Remains of its cyclopean walls, as well as of a grand amphitheatre hewn in the rock, are still to be seen.

ARGOT. See SLANG.

ARGUELLES, Augustin, a Spanish statesman, born at Riba de Sella, in Asturias, in 1775, died in Madrid, March 23, 1844. He was one of the committee of the cortes of Cadiz which drew up the constitution of 1812, limiting the royal power. On the reëstablishment of absolutism under Ferdinand VII. he was exiled to Ceuta, and thence transferred to a prison in the Balearic islands. The revolution of 1820 restored him to political life. On the restoration of Ferdinand he fled to England, where he remained until he was recalled in 1833 by the regent Christina. In the cortes he opposed the government party until the accession of Mendizabal to power, when he joined him with the expectation of restoring the constitution of 1812. In 1836 he was appointed a member of the council of regency, and in 1837 a member of the senate. He was tutor to Queen Isabella and her sister.

ARGUS, in Greek mythology, a wondrous person with a hundred eyes, or, as others have it, eyes all over his body, of which only two slept at a time. Set by Juno to watch the priestess Io, transformed into a white cow, he was lulled to sleep by Mercury, who played soothing tunes on the pipe of Pan, and then slew him with his sword.

ARGYLESHIRE, or **Argyllshire**, a western county of Scotland, including several islands near the coast, and bounded on the land side by the counties of Inverness, Perth, and Dumbarton; area, 3,255 sq. m.; pop. in 1871, 75,635. It is remarkable for its picturesque character rather than for cultivation. The population is perhaps the lowest in the British isles, about 24 to the square mile, and still on the decrease, owing to the policy of the great land owners, which has been to remove the tenantry, and to create extensive sheep walks. In 40 years the loss of population has been 25 per cent. The mountain district of Argyleshire contains Cruachan Ben, rising to the height of 3,669 feet, with many other lofty hills, celebrated in Scottish poetry. The largest of the inland lakes is Loch Awe. The mountains are chiefly of granitic formation. Of the islands, Mull, Islay, Coll, Tiree, Jura, Iona or Icolmkill, and Staffa are chiefly noteworthy. Argyleshire is not rich in mineral resources. Lead, copper, and coal are worked, but not in very great quantities. The raising of cattle and sheep is carried on with great success. The moors yield abundance of game, grouse, ptarmigan, and blackcock; the red deer is also found. The proprietorship of this large county, which comprises more than one tenth of the area of Scotland, is in few hands. The duke of Argyll, the marquis of Tweeddale, and the marquis of Breadalbane are the chief land owners. There are various natural curiosities, the most remarkable of which are the columns and cave of Staffa. Gaelic is still generally spoken, although of late years the English language has begun to supersede it. The county is popularly divided into the districts of Argyle, Cowal, Kintyre, Lorn, Appin, Islay, and Mull. Capital, Inverary.

ARGYLL, or **Argyle, Earl and Duke of**, titles in the Scottish peerage held respectively since 1457 and 1701 by the heads of the family of Campbell (called by their Gaelic dependants Mac Callum More, "Campbell the Great"), who had been Lords Campbell since 1445, and who are also English peers. **I. Colin**, 2d Lord Campbell, in 1457 made earl of Argyll, died May 10, 1493. He was appointed master of the king's household in 1464 by James III., subsequently served as ambassador to England and later to France, was justiciar or lord justiciary, and finally lord high chancellor of Scotland. He acquired by marriage the estates and titles of Lorne, which still remain in the family. **II. Archibald**, 2d earl, commanded the vanguard at Flodden Field, Sept. 9, 1513, and was killed in the battle. **III. Archibald**, 5th earl, died in 1575. He was one of the most important adherents of Mary, queen of Scots, and commander of her forces at the battle of Langside in 1568. He was one of a council of nobles who virtually ruled Scotland after the assassination of Murray. After the murder of Lennox he was an unsuccessful candidate for the regency. He was appointed, however, a privy councillor, and in 1572 lord high chancellor. **IV. Archibald**, 8th earl, born in 1598, beheaded at Edinburgh, May 27, 1661. In 1633 his father, the seventh earl, announced his conversion to the Roman Catholic faith, and was compelled five years before his death to surrender to Archibald, then Lord Lorne, nearly all his estates. Immediately on his succession Argyll joined the side of the Scottish church against the innovations of Charles I. In spite of this opposition, the king, knowing his power in Scotland, made him a marquis in 1641. On the breaking out of the civil war he at once joined the estates against the king. He was made commander of the army sent against Montrose, but was so signally defeated by that general in two engagements that he almost immediately resigned. He afterward went to meet the king at Newcastle, and, rejoining the royal side, took part later in the coronation of Charles II. at Scone, Jan. 1, 1651, placing the crown with his own hands upon the king's head. Not long after, however, he submitted to Cromwell after the battle of Worcester, and subsequently sat for Aberdeen in parliament under the protector's son Richard. At the restoration in 1660, he endeavored to make still another change, and hurried to London to conciliate the king; but he was imprisoned in the tower, and soon after sent to Scotland, where he was tried for high treason, found guilty, and beheaded. **V. Archibald**, 9th earl, beheaded at Edinburgh, June 30, 1685. He had remained faithful to the king during the revolution, and therefore at the restoration his father's estate and earldom (the marquisate having expired) were rèstored to him. But he refused to take the test oath, unless with the qualification "as far as is consistent with the Protestant faith." For this he was convicted of high treason and sentenced to death, but escaped for a time by disguising himself as a page, and going, in the suite of his stepdaughter, Lady Sophia Lindsay, to Holland. Returning at the head of an army, he was defeated, captured, and immediately executed. **VI. Archibald,** 10th earl and 1st duke of Argyll, son of the preceding, died in September, 1703. He was acknowledged earl in 1689 by the convention of estates of Scotland, though his father's attainder was not formally reversed until several years later. He took an active part in the revolution of 1688–'9, which placed William and Mary on the throne, and at the wish of the convention tendered the coronation oath to the king. The latter rewarded his services by several important appointments, and on June 23, 1701, conferred upon him the title of duke. **VII. John,** 2d duke, born Oct. 10, 1678, died Sept. 3, 1743. Immediately on his succession, although he was but 25 years old, he was appointed to nearly all the offices before held by his father, as an extraordinary lord of session, privy councillor, &c. In the reign of Queen Anne he was prominent in bringing about the union of Scotland and England, and for his services in this matter was made Baron Chatham and earl of Greenwich in the peerage of England. He served with great distinction in four campaigns in Flanders, and was made a lieutenant general. He several times changed his political views to suit the dominant party; in reward of the first of these changes, in 1710, he was appointed ambassador to Spain. On the accession of the family of Hanover, which he aided efficiently, he was made commander-in-chief of the army in Scotland, and took a prominent part in repressing the rebellion of 1715. His influence at court at this period was also very great. On April 13, 1719, he was made duke of Greenwich, a title which became extinct at his death. **VIII. Archibald,** 3d duke, brother of the preceding, born in June, 1682, died April 15, 1761. He was appointed, soon after he became of age, lord high treasurer of Scotland, and in 1710 was made lord justice general for life. After he succeeded to his brother's title in 1743, he had almost entire control of the Scottish government. He left no issue, and the title devolved upon his cousin. **IX. George John Douglas,** 8th duke, Baron Sundridge and Lord Hamilton (titles first held by the 5th and 6th dukes) in the peerage of England, 2d son of John Douglas Edward Henry, 7th duke, born April 30, 1823. His elder brother died young, and he succeeded his father April 26, 1847. Even before his succession he took a prominent part in Scotch politics, especially in the discussion regarding the Presbyterian church. On subjects connected with this he published in 1842 "A Letter to the Peers from a Peer's Son," and later several other pamphlets. In the controversy he was an adherent of Dr. Thomas Chalmers, but did not agree with that clergyman in his separation from the church. After his succession to the title and his seat in the house of lords, he became prominent as a debater. He has generally sided with the liberals. In 1852 he was appointed lord privy seal, under the ministry of Lord Aberdeen. This office he retained under Lord Palmerston till 1855, when he was made postmaster general. He retired in 1858, but in 1859 he was again made lord privy seal, and retired in 1866. In 1868 he was appointed secretary of state for India in the Gladstone cabinet. The duke has also become distinguished in science and literature. In 1854 he was elected lord rector of the university of Glasgow. His principal work, "The Reign of Law," was published in 1866. On March 21, 1871, the marquis of Lorne, his eldest son, was married at St. George's chapel, Windsor, to the princess Louise, fourth daughter of Queen Victoria. This was the first instance of the marriage of the daughter of a reigning sovereign of England to a subject.

ARGYRO-KASTRO, a town of Turkey, in Albania, on the river Deropuli, an affluent of the Voyutza, 46 m. N. W. of Janina; pop. about 7,000. It is built on the side of a mountain, and the streets are so steep that persons on horseback are obliged to dismount. The streets are separated by ravines, planted with gardens. There is a strong castle, which was enlarged by Ali Pasha, and has accommodations for 5,000 men.

ARGYROPULOS, Johannes, one of the principal revivers of Greek learning in the 15th century, born in Constantinople about 1415, died in Rome, where he held a professorship of philosophy, about 1486. He was instructor in Greek to the son and grandson of Cosmo de' Medici at Florence, whence he removed to Rome. His principal works are some Latin translations of Aristotle. He was strongly prejudiced against the Roman writers, and declared Cicero to have been alike ignorant of Greek and of philosophy.

ARIADNE, according to Homer, daughter of Minos, king of Crete, and of Pasiphaë. When Theseus landed at Crete, with the tribute of the Athenians for the Minotaur, Ariadne fell in love with him and gave him a clew of thread by means of which he found his way out of the labyrinth. Theseus offered her his hand in token of his gratitude. Ariadne eloped with him, but as they arrived upon the island of Naxos she was killed by the arrows of Diana. According to the common tradition, Theseus abandoned her upon the island of Naxos, when Bacchus married her, and after her death transferred the crown which he had given her at their wedding to the stars.

ARIALDUS, a deacon and martyr of the church of Milan, born near Milan in the first half of the 11th century, died in that city, June 28, 1066. He began to preach against the corruptions of the clergy at Milan about 1056. Aided by Landulphus, a young noble even more eloquent than himself, he aroused the popular feeling to such a degree that Pope Nicholas II. sent two legates to Milan to investigate the matter. They sustained Arialdus, but did not succeed in putting an end to the prevailing corruption. After the election of Pope Alexander II. the excitement again broke out at Milan, fomented by Arialdus and Erlembaldus, the brother of Landulphus. Pope Alexander excommunicated the archbishop of Milan, and reproved the other ecclesiastics. But even this did not conquer the abuses; and although Arialdus continued to preach against them, the fickle Milanese became jealous of the attacks from Rome on their clergy. Taking advantage of this divided state of public opinion, his enemies had Arialdus assassinated on a desert island in Lake Maggiore. His name was enrolled in the list of martyrs by Alexander II.

ARIANISM, a theological system in the early Christian Church, named after Arius, a presbyter at Alexandria. In opposition to his bishop Alexander, Arius asserted that there was a time when the Son was not coequal, since the Father who begot must be before the Son who was begotten, and the latter therefore could not be eternal. As many prominent bishops sided with Arius, synods were called on both sides, and the most acute intellects of the church discussed the question. The general council of Nice (325), attended by 300 bishops, condemned Arius and declared the Son to be consubstantial with the Father; but Arius nevertheless gained the favor of Constantine and won many new adherents. After his death (336) the movement spread more rapidly than before. When Constantine died in 337, the empire was divided among his three sons, two of whom, Constantine and Constans in the West, accepted the Nicene creed, while Constantius in the East was a decided favorer of Arianism. An anti-Nicene council at Antioch (341), consisting of 90 bishops, issued decrees on the ground of which Athanasius, who in 338 had returned from exile to his diocese, was again deposed. In the West, on the contrary, a synod at Rome in 343 declared Athanasius innocent of the charges preferred against him and the authors of his exile heretics. In order to put an end to this conflict, Constantius and Constans (Constantine had died in 340) convoked the general synod of Sardica in Lower Mœsia in 343 or 344 (not, as has heretofore been generally assumed, in 347). The Arians, having a minority of the 176 bishops present, held a council of their own, at first in the imperial palace in Sardica, and subsequently at Philippopolis. Each party anathematized the other; but the Nicæans triumphed. Constantius so far yielded to the remonstrances of Constans as to allow the return of Athanasius (349); but when he became soon after sole ruler of the empire, his influence at the synods of Arles (353) and Milan (355) secured the condemnation of Athanasius and the adoption of Arian decrees. Pope Liberius and several bishops, among them Athanasius, were banished, and Arianism was completely successful. The sect now became divided into strict and moderate Arians. Eusebius of Cæsarea declared the Son to be *homoiousios* or similar in substance to the Father, and his followers were called Homoiousians or Semi-Arians. In opposition to him, Eusebius of Nicomedia showed himself an uncompromising Arian. When the emperor attempted to enforce the Arian resolutions of Milan in the place of those of Nice, the strict Arians, under the leadership of Aëtius, deacon at Antioch, and Eunomius, bishop of Cyzicus in Mysia, attacked the Semi-Arians as well as the Nicene doctrine as illogical, and developed in opposition to it a strict subordinationism. The reputation of Eunomius in his party was so great, that their original name of Aëtians gradually gave way to that of Eunomians. They were also called Anomœans, Heterousiasts, and Exoucontians, as they maintained that the Son was dissimilar to God (*ἀνόμοιος*), of different essence (*ἑτέρας οὐσίας*), and created out of nothing (*ἐξ οὐκ ὄντων*). Several synods were held for the purpose of healing these divisions. At the second great synod of Sirmium (357) a confession of faith was adopted, to which not only the strict Arians, but even the Nicene bishops, including their leader Osius of Corduba, subscribed. But the confusion became greater than ever. An Arian synod at Antioch (358) condemned, while a Semi-Arian synod at Ancyra (358) approved the expression *homoiousios*. At the third synod of Sirmium (359) Pope Liberius subscribed to a Semi-Arian declaration in order to obtain permission to return from Constantinople to Rome. The Semi-Arians seemed to be in the ascendancy; the emperor is said to have exiled no fewer than 70 strict Arians, and Bishop Marcus of Arethusa was instructed to draw up a new confession of faith, the fourth Sirmian formula, which avoided the word *ousias* and affirmed that the Son was similar in everything to the Father. In order to reunite the whole church on this platform, Constantius wished to call an œcumenical council; but the influence of the Arians caused the convocation of two synods, an eastern one at Seleucia, and a western at Rimini. At the former there were present 105 Semi-Arians, 40 strict Arians, and 10 Nicæans; at Rimini the Nicæans had a majority. Both synods condemned the strict Arians, who however succeeded in regaining the favor of the emperor. Threats induced nearly all the bishops of both synods to subscribe to a strict Arian creed, although the most offensive party expressions were studiously avoided, and even a few of the uncompromising leaders of the party, as Aëtius, sent into exile. Thus Arianism was looked upon as the official creed of the majority of Christian bishops. But its ascendancy was of short duration. On the death of Constantius (361) and the accession of Julian the Apostate, the bishops of all parties were allowed to return to their sees, and soon the Nicene party reëstablished themselves in Egypt under Athanasius, and in Gaul, Spain, and Greece. Pope Liberius ratified the anti-Arian resolutions passed in 362 by the synod held in Alexandria, and soon the Nicene creed was predominant throughout the western countries. In the East, Arianism found a zealous supporter in the emperor Valens (364-378), and the violent measures which were adopted against both the Nicæans and the Semi-Arians induced a portion of the latter (366) to submit to the Nicene creed. With the death of Valens (378) Arianism began to decline. The emperor Gratian issued an edict of toleration (378), which allowed the exiled bishops to return and greatly strengthened the Nicene party. In 379 Gratian shared the empire with Theodosius, who the next year issued an edict threatening all heretics with the heaviest penalties, and as soon as he arrived in Constantinople took from the Arians all their churches. In 381 he convened the second œcumenical council at Constantinople, which anathematized the Arians. In another synod held at Constantinople in 383, Eunomius presented his confession of faith, which is still extant. As the Arian leaders refused to submit, still more rigorous decrees were issued, to which they appear to have soon succumbed, for the last trace of them in the eastern empire ceased under the reign of Arcadius, the son of Theodosius. In Italy the empress Justina, while regent for her minor son Valentinian II., favored the Arians; but Ambrose, the great bishop of Milan, successfully thwarted her plans, and at the synod of Aquileia (September, 381) caused the Arians to be anathematized and deposed. Moreover, the reign of Justina was too short to be of real service to the dying sect.—Crushed out in the Roman empire, Arianism for several centuries remained the religion of the Germanic tribes. The Ostrogoths professed Arianism, but without persecuting the Catholic church, until their power was lost in 553. The Visigoths were more intolerant, but in 589, by order of their king Reccared, they joined the Catholic church at the council of Toledo. The Arian Vandals, after conquering Africa under Genseric (429), began a most cruel persecution of the Catholics, which did not cease until the destruction of their empire by Belisarius (534). The Suevi in Spain adopted the Arian form of Christianity toward the middle of the 5th century; about 558 they joined the Roman communion. The Burgundians, who had come to Gaul as pagans (407), appear in 450 as Arians. The Catholic church became predominant among them under King Sigismund (517), whom Bishop Avitus of Vienne had won over to the orthodox creed. The last refuge of Arianism was with the Lombards, who entered Italy as Arians in 568. The Catholic church gained a footing among them through the wife of King Autharis, the Bavarian princess Theodelinda; and under her second husband Agilulph and her son Adelwald the Catholics obtained possession of most of the churches. A reaction followed when an Arian ascended the throne; but he was unable to suppress Catholicism, and for a time every important town had a Catholic and an Arian bishop. Under Liutprand (died 744) Arianism as a sect became extinct. As a theological opinion, however, it often reappeared, and after the reformation of the 16th century was regarded by more than one religious denomination as the true doctrine of the person of Christ. In the church of England Arian views found learned champions in Professor Whiston and Dr. Samuel Clarke.—The works of the Arian writers are mostly lost; we still possess, however, the writings of Eusebius of Cæsarea, who ranks among the ablest defenders of the ancient system, and fragments of the church history of Philostorgius. Histories of Arianism have been written by Maimbourg (*Histoire de l'Arianisme*, Paris, 1682) and J. A. Stark (*Versuch einer Geschichte des Arianismus*, Berlin, 1783); but the best source of information on the controversial aspect of the question is Baur's *Geschichte der christlichen Dreieinigkeit* (Tübingen, 1841-'3); while the history of the sect is nowhere treated of so fully as in Hefele's *Conciliengeschichte* (vols. i. and ii., Tübingen, 1855). See also Revillout, *De l'Arianisme des peuples germaniques* (Paris, 1850).

ARIANO, a town of southern Italy, in the province of Principato Ultra, 15 m. E. N. E. of Benevento; pop. about 12,000. It is built upon a steep hill, in one of the most frequented passes of the Apennines, and many of the poorer dwellings are dug into the rock and earth. It contains a fine cathedral, numerous churches and convents, several *monts de piété*, and an academy. This town has frequently been visited by terrible earthquakes, the last of which happened in 1732.

ARIAS MONTANUS, Benedictus (BENITO ARIAS MONTANO), a Spanish ecclesiastic and oriental scholar, born in a village of Estremadura in 1527, died in Seville in 1598. Philip II. sent him to Antwerp in 1568, to superintend the publication of the magnificent edition of the "Polyglot Bible," to be prepared in that city. The task employed him for four years, and he was rewarded with a pension of 2,000 ducats and a royal chaplaincy, refusing a bishopric. His works, which are numerous, are principally on Hebrew antiquities. He was an unyielding enemy of the Jesuits.

ARICA, a seaport town of Peru, in a province of the same name, department of Moquegua, in lat. 18° 26′ S., lon. 70° 24′ W., 640 m. S. E. of Lima, and 30 m. S. of Tacna, with which it is connected by railroad. It has been the theatre of many destructive earthquakes, one of the worst of which occurred Aug. 13 and 14, 1868, involving the loss of 500 lives and $12,000,000 worth of property. Not a building was left uninjured. The shocks were followed by a tidal wave in which the United States storeship Fredonia was wrecked with the loss of all hands, and the United States steamer Wateree and other vessels were carried ashore and stranded. The fortified island of Alacran, which defends the port of Arica, was submerged three times, all the garrison perishing. The first wave, which rose to about 40 feet, was succeeded by three or four others of less height. The shocks occurred on the first day every quarter of an hour, and on the second day every hour. Among the curious effects of the earthquake in the vicinity of Arica was the opening of the earth, and the disclosure of a large number of mummies, which had been buried in the sand in a sitting posture, facing the sea, in a cemetery covering a large area.

ARIÉGE, a southern department of France, formed chiefly of the old territory of Foix, and named after the Ariége river, which, rising in the eastern Pyrenees, flows N. N. W., and empties into the Garonne, after a course of 90 miles. It is bounded by the departments of Haute-Garonne, Aude, and Pyrénées-Orientales, and the Pyrenees mountains; area, 1,889 sq. m.; pop. in 1872, 246,298. The department lies principally on the northern slope of the Pyrenees, and some of the mountains on the southern border rise to an altitude of 9,000 and 10,000 feet. It contains valuable iron mines, the ore being in some places auriferous, and large quarries of marble, freestone, plaster, and slate. The Ariége carries gold sand, whence its ancient name, Aurigera. On the highlands are meadows, where cattle and merino sheep are raised in large numbers. The forests furnish good timber. Bears, wild boars, wolves, foxes, chamois, and deer are abundant. The lowlands are tolerably fertile and well cultivated, producing wheat, rye, oats, maize, millet, hemp, flax, and fruits of various kinds. Vineyards, to the extent of 5,000 acres, yield a wine of inferior quality, all of which is consumed at home. The working of metals is the principal branch of manufacturing industry; but there are saw mills and paper mills, and manufactories of cloth, hosiery, linen, and soap. It is divided into the arrondissements of Foix, St. Girons, and Pamiers. Capital, Foix.

ARIEL, a Hebrew word, signifying "lion of God," occurs as a personal name in the Old Testament, as well as a poetical designation of the altar of burnt offerings (Ezek. xliii.), and, according to general interpretation, of the city of Jerusalem (Isa. xxix.). Among the Jews of a later period, the name was, in cabalistic parlance, given to a water demon.

ARION, a musician of Lesbos, the reputed inventor of dithyrambic poetry, was a friend of Periander, the ruler of Corinth (about 600 B. C.). Having spent some time in Sicily and Italy, he amassed great wealth by his playing on the cithara, in which he excelled all his contemporaries. On a voyage from Tarentum to Corinth the sailors determined to throw him overboard and seize his treasures. Discovering the plot, he begged permission to play one melodious tune before it was put in execution, and, having done so, threw himself into the sea. The dolphins, charmed by his music, carried him on their backs to Tænarus, whence he passed over to Corinth, and on the arrival of the ship Periander had the sailors put to death.

ARIOSTO, Ludovico, an Italian poet, born in Reggio, near Modena, Sept. 8, 1474, died in Ferrara, June 6, 1533. His father was a member of the highest tribunal of Ferrara, and a friend of the duke. Ludovico was the eldest of ten children. He manifested even when a boy great ability in composition, and wrote several little comedies of some merit. At his father's wish he undertook the study of the law, though the profession was most irksome to him. After five years of study he abandoned the trial and devoted himself entirely to literature. He read the best Latin authors, under the tuition of Gregorio da Spoleto, with such assiduity that he soon became an accomplished Latinist. From ideas suggested by Plautus and Terence he wrote two dramas, *La cassaria* and *I suppositi.* His lyric poems were much admired by Cardinal Ippolito d'Este, son of Duke Ercole I. of Ferrara; and in 1503 the cardinal took him permanently into his service, and intrusted him with many important affairs, allowing him a small pension. A few years after this Ariosto began his poem of *Orlando furioso,* the composition of which occupied him for ten years or more. At the age of 24 he had become by his father's death the sole guardian and support of his nine brothers and sisters. He was obliged to fulfil the duties of a courtier and to obey the constant and petty exactions of his patron, to undertake now and then an embassy or a journey, and to take charge of much of the business correspondence of the cardinal. But while discharging all his duties faithfully, he worked constantly at his poem, and was rewarded, on its publication in 1516, by almost immediate fame. Only his patron, whom he had extravagantly praised in it, treated the work with contempt; and soon after its publication he dismissed Ariosto from his service because the poet refused on account of his health to go with him to Hungary. He soon afterward entered the service of the cardinal's brother Alfonso, then reigning duke, who treated him with generosity, but conferred upon him afterward what seemed a most inappropriate honor, in appointing him governor of the district of Carfagnana, which was everywhere infested by banditti. With unlooked-for ability in this new sphere, Ariosto soon restored order, and after three years returned to Ferrara and established himself in a pleasant home. He repeatedly revised the *Orlando,* making of it 46 cantos instead of the original 40, and greatly changing the whole. During the last years of his life he also wrote comedies and satires. The large theatre built by the duke for the performance of Ariosto's comedies was burned in 1532. The poem of *Orlando furioso* is in part of its plot almost a sequel to the *Orlando innamorata* of Boiardo, but the lesser poem did little more than suggest the greater. The *Orlando* is a fantastic story, involving a thousand interwoven episodes besides the plot from which it takes its name—a plot which follows the fortunes of Orlando made mad by love of Angelica; but so rich was its author's fancy and so bright his narrative, that even now the poem stands in Italy at the head of all poems of chivalry. It has been translated into almost every language. The principal ancient editions of the *Orlando furioso* are those of Ferrara, 1516, 1524, and 1532, published under the superintendence of the author, and the Aldine edition of 1545. The best modern edition is that of Morali (4to, Milan, 1818), which follows the original text of 1532. Of the English translations by Harrington, Hoole, and Rose, the last is by far the best.

ARIOVISTUS, a chief of the Marcomanni, a German tribe, crossed the Rhine with 15,000 warriors at the call of the Sequani, who were oppressed by the Ædui, defeated the Ædui in 72 B. C., but took one third of the land of his allies, invited his countrymen over the Rhine, and made a settlement there of 120,000 Germans, belonging to several tribes. The Ædui and Sequani called in Julius Cæsar and the Romans to their aid. Cæsar ordered Ariovistus to make no more conquests, to call no more Germans over, and to give up the hostages he held of the Gauls. Ariovistus returned an insolent reply. Cæsar marched against him and compelled him to give battle near Vesontium (now Besançon) in 58. He was defeated, and few of his warriors escaped. He himself crossed the Rhine in a small boat, and ended his days in obscurity.

ARISTA, Mariano, a Mexican general, born in the state of San Luis Potosi, Mexico, July 16, 1802, died in Spain, Aug. 9, 1855. Having distinguished himself in the successive wars which established first the independence of Mexico and afterward the republican form of government, he attained a high position in the Mexican army, and in 1836 was second in command to Santa Anna, then general in chief. By the revolutions which continually agitated Mexico he was twice deprived of his command; but his military knowledge was indispensable to every dominant party, and he was quickly restored and promoted. In the war with the United States he commanded at Palo Alto and Resaca de la Palma; and after its close was appointed in June, 1848, minister of war under President Herrera. In 1850 he was elected president of Mexico, but resigned Jan. 6, 1853, and retired to his farm, and was banished soon afterward.

ARISTÆUS, in Greek mythology, son of Apollo and Cyrene, and father of Actæon. He fell in love with Eurydice, the wife of Orpheus, whom he pursued into the fields, where she was bitten by a serpent. For this he incurred the anger of the gods. He taught men the culture of the olive and the management of bees, and was extensively worshipped in Greece and the Grecian islands as protector of pastoral life and husbandry.

ARISTARCHUS. I. An ancient grammarian and critic, born in Samothrace, flourished in the 2d century B. C. He was educated at Alexandria in the school of Aristophanes of Byzantium, and founded a critical school, which long flourished at Alexandria, Rome, and elsewhere. Alexandria and Rome alone contained at one time no fewer than 40 celebrated grammarians who had been brought up in his academy. He was the preceptor of Ptolemy Epiphanes and Ptolemy Physcon. In his old age he went to Cyprus, and being afflicted with dropsy, he put an end to his life by voluntary starvation, in his 72d year. Aristarchus is said to have written 800 commentaries on the text of the great Greek poets; but he devoted his chief labor to Homer, whose present text is based upon that adopted by him. Nothing remains of all his writings save scattered fragments. **II.** Of Samos, a Greek astronomer, flourished about 270 B. C. He was one of the first who held that the earth revolves around the sun, for which opinion some thought him guilty of impiety. The only work of his extant is a treatise on the distance and magnitude of the sun and moon, of which the original was published by Wallis in 1688, and a French translation in 1810.

ARISTIDES. I. An Athenian statesman, called the Just, died probably in 468 B. C. Of his early life little is positively known. He was one of the ten leaders of the Athenians at the time of the Persian invasion under Darius, and before the battle of Marathon persuaded the other generals to follow his example in giving up the chief command to Miltiades, instead of each claiming it for one day, as was allowed by law. This united action insured the success of the battle. The year after Marathon (489) he was appointed archon, but a few years later, by the intrigues of his rival Themistocles, he was ostracized on the pretext that he was acquiring an influence dangerous in a democracy. He employed the period of his exile in endeavoring to stir up the Grecian cities to resist the Persians, at that time preparing for a second invasion. He sought an interview with Themistocles before the battle of Salamis (480), concerted with him the plan of that engagement, and gave him his hearty support. The success of the Greeks at Platæa (479), where he commanded under Pausanias, was chiefly owing to his courage and watchfulness. The Persian war continuing, he, with Cimon, the son of Miltiades, was sent at the head of the Athenian forces to join the confederate army. When the Ionian states, disgusted with the arrogance of Pausanias, decided to form a confederation under the hegemony of Athens, Aristides was appointed to adjust the relations of the various parties to the arrangement, and to assess the expenses of the war on the several states—a commission which he executed to the satisfaction of all. When Themistocles fell under suspicion he did not join in the prosecution; and after the banishment of his rival he always spoke of him with admiration and respect. He died so poor that he was buried at the public cost; his daughters received dowries out of the public treasury, and a landed estate was bestowed on his son. **II. Ælius**, a Greek rhetorician, born at Hadriani in Bithynia, A. D. 117 or 129, died about 180. He was the son of Eudæmon, a priest of Jupiter. After travelling through the countries which border the Mediterranean, and as far as Ethiopia, he took up his abode at Smyrna; and when that city was almost destroyed by an earthquake in 178, he persuaded his friend the emperor Marcus Aurelius to assist in rebuilding it. For this Aristides was named the founder of the city, and a bronze statue was raised to him in the agora. Fifty-five of his orations and declamations have been preserved, consisting of eulogies on various divinities, panegyrics on towns, and treatises on rhetorical topics. In his "Sacred Discourses," where Aristides describes a singular malady, not unlike somnambulism, the disciples of mesmerism find something similar to the mesmeric phenomena. A statue discovered in the 16th century, representing Aristides in a sitting posture, is now in the museum of the Vatican. The best complete edition of his works is that of Dindorf (3 vols., Leipsic, 1829). **III.** Of Thebes, a Greek painter, flourished from about 360 to 330 B. C. He is said by Pliny to have been a little older than his contemporary Apelles, and to have been the first who expressed upon the countenance the passions of the soul. At the time of the Roman conquest (146 B. C.), the consul Mummius, discovering the high price set upon a battle picture by Aristides, seized it and sent it to Rome. It was placed in the temple of Ceres, and is said to have been the first foreign painting exposed to the view of the Romans.

ARISTIPPUS, a Greek philosopher, disciple of Socrates, born in Cyrene, flourished about 380 B. C. He was luxurious, sensual, and avaricious, and prided himself on extracting pleasure from both prosperity and adversity, and controlling them alike. His conversation was witty and agreeable. He is said to have incurred the dislike of Plato and Xenophon, who accordingly speak of him slightingly. He spent a part of his life at the court of Dionysius the Elder of Syracuse. His doctrine, called from his birthplace the Cyrenaic philosophy, was reduced to a system by his grandson, Aristippus the younger. It pronounces pleasure the chief good, and pain the chief evil—the former a moderate, the latter a violent motion of the soul. Pleasures differ only in their degree of purity. Actions are to be judged good or bad by their results; and in forming a judgment the only authorities are law and custom. Whatever conduces to pleasure is accounted virtue; but virtue is regarded as a quality of mind rather than of the body, since bodily pleasure is valued for the sake of the mental state it produces. A subject becomes cognizant of objects only through the medium of impressions; the only existences are states of mind; and man is the measure of all things.

ARISTOBULUS. I. A Jewish writer of Alexandria, who flourished under Ptolemy Philometor, about 160 B. C. He wrote philosophical commentaries upon the Pentateuch, composed in the purest Greek, in which he undertook to prove that the most ancient Grecian poets, historians, and philosophers were acquainted with the sacred writings, and in the habit of borrowing largely from them. In support of this theory, he forged numerous passages, ostensibly from Musæus, Linus, Homer, and others, with such art as to deceive Greek writers, and also some of the fathers of the church, who speak of him as a Peripatetic philosopher, the founder of Jewish philosophy in Egypt. Of his writings only scanty fragments have been preserved. **II.** The eldest son and successor of John Hyrcanus, the Asmonean ruler of Judea, and the first of that house who assumed the royal title. His reign lasted only one year (106-105 B. C.). According to his father's will he was to act only as high priest, with the title of *nasi* (prince), and his mother to carry on the affairs of state. Impatient to rule, he threw his mother into a dungeon, where she perished of hunger, imprisoned three of his four brothers, and proclaimed himself king. The queen, Salome or Alexandra, persuaded Aristobulus that his remaining brother Antigonus meditated treason and usurpation, and he was cut down by the royal guards. Aristobulus, who was sick, grew worse from remorse and vomited blood, which, being carried off by a domestic, was spilled on the very spot on which the blood of Antigonus had been shed. The parricide saw in the accident a sign of the vengeance of Heaven, and soon after expired in terrible agony. **III.** Son of Alexander Jannæus, the brother and successor of the preceding. His history can be properly treated only in connection with that of other persons. (See HEBREWS.)

ARISTOGITON. See HARMODIUS AND ARISTOGITON.

ARISTOMENES, a Messenian general and statesman, the hero of the second Messenian war, of the royal line of Æpytus. The Messenians, having determined to free themselves from the tyranny of their Spartan conquerors, selected him as their chief. He formed an alliance with Argos, Elis, Sicyon, Arcadia, and Pisa; but before the troops they promised him could arrive, he began the war by the indecisive battle of Deræ, 685 B. C. His exploits in this conflict induced his countrymen to offer him the throne of Messenia, but he refused it. In the same year he entered Sparta alone, by night, and fastened a shield with a taunting inscription to the temple of Minerva. During the next year he won great victories at the Boar's Pillar (*κάπρου σῆμα*) in the plain of Stenyclerus, and at Pharæ, which latter place he sacked. But in 682, betrayed by his ally Aristocrates of Arcadia, who deserted him in the midst of the fight, he was utterly defeated, his army almost destroyed, and he himself compelled to take refuge in the mountains with his few remaining troops. Here he continued the war with great pertinacity for 11 years. Having been captured by the Spartans in one of his incursions, he was thrown into a cavern into which malefactors were cast; but he was uninjured by the fall, and escaped by following a fox through a passage leading from the cave. Again captured, he escaped by the aid of a young girl. He twice offered to Zeus the *hekatomphonia*, or sacrifice prescribed for one who had slain with his own hands 100 enemies in battle. At last the Spartans surprised at night his fortress of Ira, in the mountains; but even then they encountered such a resistance that they were obliged to consent to his terms, which permitted him and his followers to retire unmolested. Soon after this he formed a new plan of attack on Sparta; but for the second time he was betrayed by Aristocrates, who was killed for his treachery. The countrymen of Aristomenes were now exhausted, and their army was too small to continue the war. Many of them, under the hero's two sons, went to Rhegium and formed a colony there. Aristomenes went to Rhodes, where one of the reigning princes had married his daughter, and there ended his life peacefully.

ARISTOPHANES, the only writer of comedy in ancient Greece any of whose entire works are still extant, probably born between 450 and 444 B. C., died not later than 380. Very little is known of his life outside of his literary work, the only sources of information being allusions of contemporaries, passages in his plays, and a very unsatisfactory biography by an unknown ancient author. He was an Athenian of the tribe Pandionis, the son of a certain Philippus or Philippides; though traditions, probably having their origin in the attempts of his enemies to deprive him of the privileges of a native Athenian citizen, speak of him as born in Rhodes, others in Egypt, Camirus, or Naucratis. He seems to have appeared as a comic poet in the fourth year of the Peloponnesian war (427). A clue to the time of his birth is found in the fact that at this time he was too young to compete for a prize, and that his first comedy, "The Banqueters," was therefore produced under the name of another. In 426 he produced "The Babylonians;" in 425 "The Acharnians," still extant, which, put in competition in the name of Callistratus, won the first prize. In some passages of these earliest works he had satirized Cleon, the Athenian demagogue, and the latter avenged himself by making the first of those attempts noticed above to prove that Aristophanes was of foreign birth. This attempt was afterward twice repeated, but each time the poet successfully repelled the charge. In 424 he attacked Cleon with unsparing satire in the famous comedy of "The Knights;" and finding no actor brave enough to take the part of the demagogue, then at the height of his popularity, Aristophanes played the rôle himself, with his face smeared with lees of wine; for no one dared even to make a mask representing Cleon. His plays now appeared in rapid succession. Of the 54 which we are told he wrote, we possess 11, which, besides "The Acharnians" and "Knights" already mentioned, are as follows: "The Clouds," produced in 423 B. C., directed against the Sophists and their leader Socrates; "The Wasps," 422, an attack on the corruption of the courts; "The Peace," 419, written to point out the evils wrought by the Peloponnesian war; "The Birds," 414, to ridicule the Sicilian expedition; "Lysistrata," 411, a further picture of the evils brought about by the Peloponnesian war; "Thesmophoriazusæ," probably in the same year, an attack on Euripides; "Plutus," 408, ridiculing the imitation of Dorian fashions which prevailed at the time of its production; "The Frogs," 405, a second satirical attack on Euripides; "Ecclesiazusæ," 392, a play with the same aim as "Plutus." Of the comedies of Aristophanes it is excessively difficult for a modern reader to form anything approaching to an accurate judgment. His wit is expended on topics so purely local, that it requires the closest acquaintance with the occurrences and characters of the day, the temper of the people, and the every-day circumstances of Athenian life, to enable a person to appreciate and enjoy his humor. His style and versification are among the best examples left us of a complete mastery of the Attic dialect. In general, the persons and things which Aristophanes attacked were worthy of condemnation. Where a prominent exception to this statement is found in the case of Socrates, he probably only seized upon the natural temptations offered to a satirist by the philosopher's notoriety and eccentricities; and it seems most improbable that he acted, as many have thought, in collusion with the future accusers of the great Sophist.—Among the best editions of Aristophanes are those of Küster and Brunck, and that of Invernizzi, completed by Beck and Dindorf; besides some editions of separate plays of rare excellence by Mitchell, who has also ably translated some of the number, and by Prof. Felton of Harvard university. An admirable translation of five plays was made by John Hookham Frere while in Malta, which were first printed for private circulation, but are now contained in the collective edition of his "Works" (London, 1872).

ARISTOTLE (Gr. 'Αριστοτέλης), perhaps the greatest ancient philosopher, founder of the school of Peripatetics, born in Stagira, a Greek colony of Macedonia, near the mouth of the Strymon, in 384 B. C., died at Chalcis, on the island of Eubœa, in 322. From his birthplace he was called "the Stagirite." He studied for a short time at Atarneus in Asia Minor, and at

17 years of age went to pursue his studies in Athens, where he resided for 20 years. He was a pupil of Plato, whom he sincerely admired, though opposed to him in philosophy. Plato was accustomed to call him, on account of his enthusiasm for knowledge and his restless industry, the "intellect of his school." About 343 B. C. Philip of Macedon made him the teacher of his son Alexander, at that time 13 years old. His influence on Alexander and Philip was for many years very great and salutary, and Philip rebuilt at his request the city of Stagira, which had been destroyed, and erected there, in a pleasant grove, a school called Nymphæum, where Aristotle was to teach. Alexander after the conquest of the Persian kingdom presented him with 800 talents, or nearly a million of dollars. He also sent to him whatever he discovered on his marches that was unknown in Greece, such as plants and animals for scientific examination, and is said to have been accompanied by him in several of his expeditions. Aristotle returned to Athens in 335, or, according to Ammonius, in 331, bringing with him his scientific collections, and established a new school of philosophy in the Lyceum, a gymnasium near the city. In the forenoon he instructed his intimate pupils in a philosophical way, which lectures were called esoteric; and in the evening he taught a large popular circle about plainer matters, in what were called exoteric or public lectures. His philosophical school is called the Peripatetic, because he taught while walking up and down (περιπατῶν), or from the shady walks (περίπατοι) around the Lyceum in which he delivered his lectures, and which in the time of Plutarch were still pointed out to the traveller. His friendly relations with Alexander were at length interrupted, perhaps on account of admonitions which he sent to that conqueror when, in his later years, he precipitated himself into a dissolute life. Yet the Athenians suspected him of partisanship for Macedonia, accused him of impiety, and forced him to flee to Chalcis, where he died.—Only a part of his numerous writings on almost every branch of science and art were then published; of the remainder many were lost, and many published only in the first centuries of the Christian era. The most important of them bear the following titles: "Organon" or "Logic," "Rhetoric," "Poetics," "Ethics," "Politics," "History of Animals," "Physics," "Metaphysics," "Psychology," and "Meteorology." His writings on mathematics, economy, and history are lost, as well as his letters, and a work called *Politiai*, which contained 158 ancient state constitutions and legislations. Many books bearing his name are spurious, and it is only in the present century that the spurious begin to be sifted from the genuine. His style is difficult to understand, not only because of the intricacy of the subjects, but also on account of the technical terms entirely his own. No other philosopher has exerted so large an influence on so many centuries, and on the ideas of so many nations, as Aristotle. His merits as a metaphysical thinker may perhaps be variously estimated, but his performances in natural science, which he first created, and his method of philosophy, constitute his greatness. He was the first careful observer, dissector, and describer of animals. He first divided the animal kingdom into classes; described a great many animals before unknown to the scientific world; came near discovering the circulation of the blood; discriminated between the several faculties, the nourishing, feeling, concupiscent, moving, and reasoning powers of animal organism, and attempted to explain the origin of these powers within the body; and built his moral and political philosophy on the peculiarities of human organization. His philosophical method consists in the principle that all our thinking must be founded on the observation of facts. Logic is the fundamental science, and the principles which he laid down for it have never been superseded. It is acknowledged by Kant and Hegel, the two most profound thinkers of Germany, that from the time of Aristotle to their own age logic had made no progress. He invented the categories, or fundamental forms of thought, universal expressions for the ever-changing relations of things, and limited their number to ten; and he devised the so-called "syllogistics," or science of forming correct conclusions. He likewise became the father of modern psychology, showing how the mind creates its speculative methods and general notions; and that though we cannot prove their correspondence with the reality, because there is no direct proof for things which transcend our senses and observation, yet we are always compelled to recur to these general notions and take them for indispensable forms of thinking, if we will think at all. Every science must, according to Aristotle, have a fundamental principle, which need not and cannot be logically proved, because it is in itself certain, and accepted as manifest truth. Aristotle first discriminated between the substance of things and their accidental peculiarities, and created the philosophical notions of "matter" and of "form." He also established the philosophical notions of "space" and "time," and showed their connection with matter, while he first furnished the world with what is commonly called the cosmological argument for the existence of God. He states it thus: Although every single movement and existence in the world has a finite cause, and every such finite cause another finite cause back of it, yet back of this infinite series of finite causes there must be an infinite immaterial being, a first something, unmoved, all-moving, pure energy, absolute reason, God. In psychology and anthropology, Aristotle is the author of the theory of different powers of the soul, of distinct feeling, willing, reasoning, and moving powers or faculties. The reasoning power is

regarded by Aristotle not as a product of the body, but as bestowed on it from outside, and as perfect only after its separation from the body by death. Proceeding from the principle that whatever is to be the goal and highest good of humanity must not depend on casualties and ever-changing minor circumstances, but must be certain in itself, and impart to every other good its value, he maintains that the *eudaimonia*, or highest possible pleasure which is conceivable for man, is derived only from the perfect satisfaction of those faculties which distinguish him from the beasts, that is, of the reasoning powers.—Of his earliest pupils and followers, none but Theophrastus, and he not strictly a philosopher, is worth mentioning. The age after Aristotle's death was not favorable to purely speculative philosophy. For three centuries Stoicism and Epicureanism took the place of his philosophy in the favor of the educated world; and these were succeeded by Neo-Platonism. Later the philosophy of Aristotle was rendered obnoxious to the fathers of the church by the pagan tendencies of its expounders at Alexandria, but a few, like Boëthius, ventured to defend his views. Up to the 11th century Aristotle was almost unknown to the Christian world, but he was a favorite with the Arabians of the 8th, 9th, 10th, and 11th centuries. Through the Arabians, the scholastic writers of the 11th century made acquaintance with his "Physics" and "Metaphysics," though by means of very imperfect translations; his "Logic" they had, though not extensively, known before. From that time Aristotle, though sometimes disparaged as a heretic, remained for four centuries the authority of the Christian world in all matters not strictly pertaining to dogmas. In the 11th century the dispute between the nominalists and realists began to divide theologians; the realists asserting with Plato that our general notions, called *universalia*, are the substance of things, that our ideas answer not only to the reality of objects, but contain their soul and life; the nominalists, in the name of Aristotle, maintaining that these general notions are mere abstractions, inventions of the brain, not expressing the real substance of things. From the exposition that we have given, it appears that this pretended Aristotelianism was a misunderstanding of Aristotle's philosophy, which, though it admits on the one hand that our general notions cannot be demonstrated to express the full substance of things, yet at the same time asserts that they are indispensable for every purpose of thinking. After the restoration of classical literature in the 15th century, his writings were extensively published, and his philosophy began to be better understood; and it has been further developed by Bacon, Descartes, Spinoza, and Kant. Fichte, Schelling, and Hegel opposed it, though the latter adopted many of its ideas. It is, however, not so much by his philosophical system that Aristotle has wielded his enormous influence, especially as this is only now beginning to be fully understood and justly appreciated, as by his logical inventions, and his method of philosophy in general.—The best works on the contents, spirit, and bearings of the writings of Aristotle are Stahr's *Aristotelia* (2 vols., Halle, 1830); Franz Biese's *Philosophie des Aristoteles* (2 vols., Berlin, 1835–'42); and "Aristotle," a posthumous work, by George Grote (London, 1872). The best complete edition of Aristotle is that of the academy of sciences at Berlin, by Immanuel Bekker (4 vols., Berlin, 1831–'6), with Latin translations and extracts from the old commentaries.

ARISTOXENUS, a Greek writer on philosophy and music, a pupil of Aristotle, born at Tarentum, Italy, flourished about 320 B. C. According to Suidas, he published 450 works on all imaginable subjects. All these are lost excepting his 'Αρμονικά Στοιχεῖα ("Principles of Harmony"), published in Latin at Leyden in 1562 by Gogarinus, and in 1616 in Greek by Meursius, and subsequently inserted by Meibom in the *Antiquæ Musicæ Auctores* (2 vols. 4to, Amsterdam, 1652). Aristoxenus's theories of music were opposed to those of Pythagoras, who made music dependent upon mathematics, while the former admitted only the test of the ear.

ARITHMETIC (Gr. ἀριθμητική, from ἀριθμεῖν, to count), the science of the properties and relations of numbers when expressed with figures or relations of figures. The accepted opinion is that we have derived this science from the Greeks, who obtained it from the Phœnicians; but if we consider that the Chaldeans, one of the oldest nations, have given us the knowledge of certain astronomical cycles or periods, of which the determination required an advanced knowledge of arithmetic, it is evident that its origin is of much earlier date. The Hebrews and Greeks used the first nine letters of their alphabet for the numbers 1 to 9; the next nine letters for 10, 20, &c., to 90; and the others for hundreds; while for thousands they recommenced the alphabet and added to each letter a mark or iota. The Romans followed a similar system, of which our Roman numerals are a specimen. But arithmetic did not reach its more modern state of progress until the introduction of the Arabic figures now used by all civilized nations. The Arabs admit that they obtained these figures from Hindostan in the 10th century. They call them Indian figures, and arithmetic the Indian science. Boëthius, in his work *De Geometria*, informs us that the disciples of Pythagoras used in their calculations nine peculiar figures, while others used the letters of the alphabet; and it is probable that this philosopher, who had travelled considerably, had obtained this knowledge in Hindostan, and communicating it as a secret to his disciples, caused it to remain sterile in their hands. The Greeks in the ordinary way of writing expressed the fractions thus: while β, γ, δ, &c., stood for 2, 3, 4, &c., β′, γ′, δ′, represented ½, ⅓, ¼, &c. The oldest text book on arithmetic employing the Arabian or Indian figures, and the decimal system, is undoubtedly that of Avicenna, the Arabian physician, who lived in Bokhara about A. D. 1000; it was found in manuscript in the library at Cairo, Egypt, and contains, besides the rules for addition, subtraction, multiplication, and division, many peculiar properties of numbers. (For a translation of a portion of this remarkable manuscript by Marcel, see De Montfévrier, *Dictionnaire des sciences mathématiques*, vol. i., p. 141 *et seq.*) It was not till the beginning of the 13th century that the science of arithmetic began to be diffused in Europe. One of the earliest writers on the subject was John Halifax, better known as Sacro-Bosco, who in the 13th century composed an arithmetic in Latin rhymes, in which the shapes of the figures are nearly identical with those of the present day. The monk Planudes, who flourished in the early part of the 14th century, wrote a book entitled "Indian Arithmetic, or the Manner of Reckoning after the Indian Style," of which several manuscripts still exist. Contemporary with him was Jordanus of Namur, author of the *Algorithmus Demonstratus*, and also of a treatise on arithmetic which Jacques Faber published with commentaries immediately after the invention of printing. A great development of the science now took place. In the 16th century Clavius and Stifelius (Stiefel) in Germany and Digges in England were conspicuous for their services to this science, and the Arabian or Indian figures came into use among the learned; but it was not till the 17th century that arithmetic began to be a regular branch of common education. —The value of our system of arithmetical notation, as is well known, consists in the adoption of a scale and of a system by which the place of the figure in the order in which it appears causes its value to increase in multiples of that scale. The universally adopted scale is the decimal, probably derived from the number of fingers of the human hand, but other scales might have been adopted as well; and the advantages which some persons suppose might have been derived from the adoption of a different scale, as the duodecimal or twelve, the tonal or sixteen, &c., are more apparent than real. A smaller scale would, however, have simplified arithmetical operations, as was forcibly demonstrated by Leibnitz, who showed how with the smallest possible scale, the binary, and the consequent use of only two figures, 1 and 0, operations were so much simplified that there might be even a saving of time in reducing a decimal expression into a binary one, performing the operation, and restoring it back again into the decimal system. The regular series of numbers, one, two, three, four, five, six, seven, eight, nine, &c., is expressed in the binary system thus: 1, 10, 11, 100, 101, 110, 111, 1000, 1001, &c.; in the ternary system, in which three is adopted as the basis, it is 1, 2, 10, 11, 12, 20, 21, 22, 100, &c.—When arithmetic goes beyond the practical calculations by numbers, and treats of the properties of numbers in general, it enters the field of algebra. The properties of numbers are of two kinds: some are general and inherent in the numbers themselves, while others depend on the decimal system adopted. Thus the law that the sum of two numbers multiplied by their difference is equal to the difference of their squares is a general property; while the fact that if the sum of the figures is divisible by 9, the whole number is divisible by 9, is a property depending on the adoption of the decimal system; if we had adopted the duodecimal system, 11 would have that property.—Besides ordinary arithmetic, we may distinguish a palpable arithmetic performed by the sense of feeling by the blind; an instrumental arithmetic, where the solutions are obtained by peculiarly contrived instruments; a tabular arithmetic, where problems are solved by means of tables computed for the purpose, &c.—Pestalozzi, the great German pedagogue, applied his method to instruction in arithmetic with the most eminent success. It was introduced into the United States by Warren Colburn of Massachusetts, by the publication of treatises on this subject which have largely influenced the authors of arithmetical text books, a great variety of excellent practical works having since been published, to which we refer for further information in regard to the practical details of this science.—For many curious facts on the properties of numbers, see Gauss, *Disquisitiones Arithmeticæ*, or Legendre, *Théorie des nombres*.

ARIUS, the founder of Arianism, according to some a Libyan, according to others a native of Alexandria, died in 336. He joined the Meletians in Alexandria, but left them, and in 306 was ordained a deacon by Bishop Peter of Alexandria. He afterward returned to the Meletians and was excommunicated, but was readmitted to the church by Achillas, successor of Peter, and ordained priest. After the death of Achillas, Arius came near being elected bishop of Alexandria; but Alexander was preferred to him. According to the Arian historian Philostorgius, Arius himself brought about the election of Alexander. It is reported that for several years Alexander held Arius in high esteem, and that the most perfect agreement existed between them. The great controversy with which their names are connected began when Alexander made an address to his clergy in which he spoke of the Trinity as consisting of a single essence. Arius exclaimed against this, affirmed the distinct personality of the Father and the Son, and accused Alexander of Sabellianism. Alexander demanded from Arius a recantation; but the latter not only refused this, but sent a written confession of faith to several bishops, requesting, in case they agreed with him, their intercession with Alexander in his behalf. A number of prominent bishops responded favorably; among them were Eusebius of Cæsarea, the church historian, and Eusebius of Nicomedia, who as bishop of the imperial residence had a great influence over Constantine and his sister Constantia. Alexander therefore convened a synod at Alexandria in 320 (or according to some authorities in 321), which was attended by about 100 bishops from Egypt and Libya, at which Arius and his adherents were "expelled from the church which adores the divinity of Christ." As Arius nevertheless continued to teach and to hold divine service, Alexander addressed circular letters to the bishops, in which he asked them not to admit the Arians to the communion of the church, and not to believe Eusebius of Nicomedia and "people of that class." Expelled from Alexandria, Arius went to Palestine, whence he addressed a defence of his doctrine to Eusebius of Nicomedia. Invited to Nicomedia, he wrote thence a letter to Alexander, endeavoring in language as conciliatory as possible to prove his views to be those of the fathers of the church. Here he also wrote his most important work, the *Thalia* ("Banquet"), fragments of which are extant in the writings of Athanasius, and composed several songs designed to make known his principles among the people. A synod held in Bithynia about 323 allowed Arius to hold divine service, and interceded in his behalf with the bishop of Alexandria. The division in the church had now become so great that Constantine was induced to convoke the œcumenical council of Nice in 325, to put an end to the controversy. Arius was present at the council, in which the young deacon Athanasius of Alexandria distinguished himself as the foremost opponent of the Arian views. The council decreed the Son to be consubstantial (ὁμοούσιος) with the Father, deposed and condemned Arius, ordered his writings to be burned, and made it a capital offence to own them. The emperor banished Arius to Illyria, and soon the bishops Eusebius of Nicomedia and Theognis of Nice shared the same fate for refusing submission to the decrees of the council. After a time, however, Constantine was induced by his sister and many in his court, who were in sympathy with Arius, to recall and hear him. This was the beginning of new and violent conflicts. In Alexandria the Arians entered into negotiations concerning a union with the Meletians. A synod at Tyre in 335 deposed Athanasius, who was then banished by the emperor to Treves. In 336 Constantine undertook to enforce the recognition of Arius in Constantinople; but on the day fixed for the recognition Arius fell dead in the street. Some of his friends ascribed his death to poison, some of his opponents to the efficacious prayer of the orthodox bishop of Constantinople. (See Arianism.)

ARIZONA, a territory of the United States, situated between lat. 31° and 37° N. and lon. 109° and 114° 40′ W., bounded N. by Utah, E. by New Mexico, S. by Mexico, and W. by California and Nevada; area estimated at 113,000 sq. m. No complete survey of the territory has been made. It is divided into five counties: Maricopa, Mohave, Pima, Yavapai, and Yuma. Tucson, in Pima county (pop. 3,224), is the capital and largest town in the territory. Arizona City, in Yuma county (pop. 1,144), is a prosperous business place, situated at the junction of the Gila and Colorado rivers. Prescott, the former capital (pop. 668), is situated in central Arizona, and is the headquarters of the military department of Arizona. In 1870 the population of the territory, exclusive of Indians, was 9,658, of whom 3,849 were native and 5,809 foreign born; 1,240 were born in the territory. The total number of Indians was 32,083; of these 4,352 were on reservations and at agencies, and 27,700 were nomadic. Many of these Indians are friendly to the whites, but the greater number are intensely hostile. Of the friendly Indians, the Pimas and the Maricopas rank first in numbers and civilization. They occupy a reservation on the Gila river, about 200 m. E. of Arizona City. The Papagos live S. of the Gila, along the line of Sonora. The Mohaves and the Yumas live along the Colorado, the Utes on the upper Colorado, and the Moquis and Navajos in N. E. Arizona. These tribes are engaged in agriculture and stock-raising. Of the hostile Indians the Apaches are the most powerful and warlike. They comprise several tribes distributed over the greater portion of middle and eastern Arizona; their raids extend all over the territory, with the exception of a narrow strip along the Colorado river and a portion of the lower Gila. Besides the Apaches, the Hualpais or Wallapis, living in the Cerbat range near the Diamond river, and in part of the Aquarius range, are the only dangerous Indians.—The middle and N. E. portions of the territory consist of elevated plateaus from 3,000 to 8,000 ft. above the sea level, with occasional bluffs and volcanic cones rising from 500 to 2,500 ft. above the plateau. The numerous parallel ranges of mountains have a general N. W. and S. E. course, and form long valleys in the same direction. The most marked exceptions to this general direction are the Mogollon range in the east, which extends nearly E. and W. and joins the Sierra Blanca, and an E. and W. range stretching beyond Arizona into New Mexico. The axis of the Black mountains and the Cerbat range, in the N. W. part of the territory, lies very nearly N. and S. The S. portion of the territory is a plain with a slight elevation above the sea, amounting at the mouth of the Gila to only 200 ft. From this plain isolated mountains and mountain ranges rise abruptly. In central Arizona the Sierra Prieta and the Aztec range send foot hills out in every direction, and their flanks sink very gradually to the level of the high plateau surrounding the San Francisco mountain toward the N. E., and to the *mesas* or table lands sloping toward the Colorado on the S. W. The elevation of the town of Prescott is over 6,000 ft. above the sea, while the Tonto and San Francisco plateaus, E. and N. E.

of Prescott, reach an altitude of from 8,000 to 9,000 ft. The San Francisco, a grand volcanic cone, is the highest mountain in Arizona, its summit being over 11,000 ft. above the sea. N. and N. E. of the San Francisco mountains, an immense *mesa*, increasing in altitude toward the Utah line, extends for hundreds of miles. —The largest river of the territory is the Colorado, which is formed by the junction of the Green and Grand rivers in the S. part of Utah, and has a southerly course along the W. boundary of Arizona. It has a very rapid current, and is navigable as far as Callville, 612 m. above its mouth. The cañons formed by the passage of the river through the lofty table lands are unequalled in grandeur. In the Grand cañon of the Colorado the deep and narrow current flows between massive walls that rise to a perpendicular height of nearly 7,000 ft. above the water. The principal tributaries of the Colorado are the Colorado Chiquito, which flows N.W. through the N. part of the territory, the Diamond river, and Bill Williams's Fork, into which flows the Santa Maria. The Gila rises in New Mexico, flows W. through the S. part of Arizona, and joins the Colorado about 180 m. above the gulf of California. It is a very narrow stream with a swift current, shallow during most of the year, but in the rainy season vastly increasing its volume. Its principal tributaries in Arizona are the Salado or Salt river, Verde, San Carlos, Bonito, and Prieto from the north, and Santa Cruz and San Pedro from the south.—Granite, red and white sandstone, limestone, slate, quartz, and metamorphic rocks abound in the mountains. The plains along the lower Gila are entirely made up of quaternary and tertiary deposits, which also form the great Sonora desert S. of that stream. In the Colorado valley, the sedimentary strata consist of quaternary and tertiary gravels and conglomerates, varied in a few localities by a layer of white infusorial earth. The bottom lands consist of calcareous sands and clays, the former predominating. The mountain chains are composed of granites, syenites, porphyries, trachytes, greenstone, basalt, and metamorphic slates. A section of the Grand cañon of the Colorado, 6,800 ft. above the sea level and 5,500 ft. above the river, exhibits the following sedimentary strata down to the underlying granite: upper carboniferous limestone; cross-stratified sandstone; red calcareous sandstone, with gypsum; lower carboniferous limestone; limestones, shales, and grits—Devonian; limestones, mud, rocks, and sandstones — Silurian; Potsdam sandstone; granite. No one of the mineral-bearing territories of the Pacific slope is richer than Arizona, though the mines have not been generally worked. The inaccessibility of the territory (it being off from the great overland lines of travel and without seaports), and the fierceness of the Apaches, have prevented the full development of its mineral wealth. The mountains of southern and central Arizona are nearly all mineral-bearing, and contain lodes of gold, silver, copper, and lead. The ores of silver found in this region are argentiferous galena, native silver, auriferous sulphuret of silver, black sulphuret of silver, sulphate of silver, sulphate of iron, combined. The ores of copper are usually the sulphurets, principally gray. Nearly all the silver and copper lodes show traces of gold; and placers have been found at many points, but have not proved sufficiently extensive to attract much attention. Gold is found in central Arizona, the ore yielding from $25 to $100 per ton. Iron in carbonates and oxides is abundant, and traces of tin and nickel exist. Platinum (metallic) is shown in the placers of the Black cañon. Copper, silver, and quicksilver are found together in a rare combination, but the lode is not large. Lime of a superior quality exists in large quantities near Prescott and Tucson, and is found at other points. Beds of gypsum exist in the San Pedro valley. The salt mountains near Callville and a few miles E. of the Colorado are among the most remarkable formations in Arizona. The deposits of pure, transparent, and beautifully crystallized salt are very extensive, and no salt is superior for table and general use. Traces of coal have been discovered in this locality. The bullion product of Arizona for 1868 was estimated at $250,000; 1869, $1,000,000; 1870, $800,000.—The climate is mild and generally healthful. In southern Arizona the temperature ranges from 34° to 118° F. The atmosphere is dry, and this region is singularly free from malarious diseases. Snow falls in central Arizona, but, excepting in the higher mountains, disappears in a few hours. The temperature in summer rarely exceeds 90°, and seldom falls below zero in winter. Rain falls mainly in the months of July and August, but there are frequent showers in April and May, as well as in the winter months. The average fall of rain in southern Arizona for 1867 was 2·94 inches; 1866, 4·20; 1858, 8·57; 1857, 0·33. The climate of Arizona is said to be highly beneficial to those afflicted with bronchial or lung diseases. According to the census of 1870, the total deaths in the territory for that year were 252, of which 116 resulted from general diseases, 71 from local diseases, 60 from accidents and injuries, and 5 from poisons. Of the local diseases, 44 were diseases of the respiratory system and 15 of the digestive system.—The vegetation of southern and western Arizona is scanty and limited to a few genera, such as cactus, aloe, artemisia, *palo verde*, ironwood, and mesquite, the last a remarkably hard wood. In the middle and N. E. portions of the territory a more varied vegetation prevails. On the hills and mountain sides a rich and abundant pasturage is found. Pine and cedar forests abound; while along the course of the streams ash, walnut, cherry, willow, cottonwood, and many other forest trees grow, and large oak trees are seen on the summits of some of the highest mountains in the Sierra Prieta. The aridity of the table lands prevents their cultivation; the soil of the valleys is rich, but in places very arid. Where artificial irrigation is practicable, or where there is sufficient moisture, the crops are good, and the cereals yield abundantly. The greater portion of the territory S. of the Gila river is a sterile waste; but the river valleys of this section contain many thousand acres of the most fertile bottom lands, which need only irrigation to make them yield abundant harvests. Indian corn, wheat, barley, oats, grapes, figs, oranges, lemons, sweet potatoes, tomatoes, tobacco, the castor bean, &c., thrive here wherever the land can be irrigated; there is also much valuable grass land in this section. The valleys of middle and eastern Arizona contain much arable land. Here all the cereals and roots of the northern Atlantic states are grown, while as a grazing country this region cannot be surpassed. A thick growth of gramma and bunch grass covers the whole country, and gives to the pine woods of this region the aspect of beautiful natural parks. Wheat and barley are usually sown from November to February, and harvested in May; the average yield of wheat is from 20 to 40 bushels per acre, and of barley from 30 to 60. After the wheat and barley are harvested, corn can be planted on the same soil with ample time for it to mature. Much of the land of Arizona is cultivated in this way, and produces two crops each year. The average yield of corn is from 30 to 60 bushels per acre. In 1870 there were 14,585 acres of improved land in the territory, producing 27,052 bushels of wheat, 32,041 of corn, and 55,077 of barley; and the estimated value of all farm productions, including betterments and additions to stock, was $277,998. Cash value of farms, $161,340; of all live stock, $143,996; of slaughtered animals, $9,400.—There are no railroads in Arizona. The Atlantic and Pacific railroad company have obtained a charter with land grants to build a road along and near the 35th parallel to the Pacific ocean; this road has been completed from St. Louis into the Indian territory. A charter and lands have also been granted to the Texas Pacific railroad company to build a road on or near the 32d parallel, from Marshall in Texas to San Diego, California. There is a good wagon road from San Diego, crossing the Colorado river at Arizona City, thence to Tucson and Santa Fé. The last named town is connected with Prescott by a wagon road via Albuquerque. From Prescott to Los Angeles, Cal., there is a wagon road by way of Wickenburg, Ehrenberg, La Paz, and San Bernardino, and also by way of Hardyville and Mohave.—The government is administered by a governor, secretary, treasurer, and auditor, who are appointed by the president of the United States. The legislature and a delegate to congress are elected by the people. The judicial power is vested in a supreme court, consisting of three judges appointed by the president, and probate courts. The supreme court holds one session annually at Tucson. The salary of the governor and of the judges of the supreme court is $2,500. In 1870 the assessed value of real estate was $538,355; personal property, $871,940; total, $1,410,295; true value of real and personal property, $3,440,791; total taxation not national, $31,323. The internal revenue collections for 1871 amounted to $16,889.—According to the census of 1870, there were in the territory 1,923 persons between the ages of 6 and 21 years; the number attending school was 149. There were 2,690 persons over 10 years of age unable to read, and 1,934 over 21 years of age unable to write. The legislature has passed a school law levying a tax for school purposes of 10 cents on each $100 of the taxable property of the territory, and giving authority to the several boards of supervisors of the counties and the boards of trustees of the school districts to levy additional taxes sufficient to maintain a free school in each of the school districts. Four weekly newspapers are published in the territory.—As early as 1526 Don José de Vasconcellos crossed the centre of Arizona toward the Great cañon, and the country was subsequently visited by other Spanish explorers. Numerous ruins of Spanish towns and buildings indicate that here was the seat of an early Spanish colonization, and that the land was highly cultivated. In the N. W. part of the territory, on the Colorado plateau, is a group of pueblos in ruins, containing *estufas*, reservoirs, terraces, aqueducts, and walls of at least four stories high. The most extensive ruins are found in the Gila valley, which is studded throughout with deserted pueblos and remains of irrigating canals, *acequias*, pottery, &c. The river banks are covered with ruins of stone houses and regular fortifications, which do not appear to have been inhabited for centuries. The walls are of solid masonry, rectangular in form, and usually two stories high. It is estimated that at least 100,000 people must have occupied the Gila valley at one time. —The territory of Arizona was separated from that of New Mexico and organized by act of congress passed Feb. 24, 1863. The portion N. of the Gila river was obtained by the treaty of Guadalupe Hidalgo, Feb. 2, 1848, while that S. of the Gila was acquired under the treaty made by James Gadsden at Mexico, Dec. 30, 1853. The act of Feb. 24, 1863, creating the territory, describes it as comprising all the United States lands W. of lon. 109° to the California line, which before that time had belonged to the territory of New Mexico. Since then the N. W. corner has been ceded to Nevada. No thorough exploration of central Arizona was attempted until 1862 and 1863, while much of the northern portion is unexplored. (See supplement).

ARJISH or **Erjish Dagh** (anc. *Argæus*), the loftiest mountain of Asia Minor, lying 13 m. S. of Kaisariyeh (anc. *Mazaca Cæsarea* in Cappadocia), and 117 m. N. by W. from the head of the bay of Iskanderun. It ascends in an insulated peak to the height of 13,100 ft. It is distinctly visible at a distance of 160 m., and it was believed by the ancients that both the Euxine and the Mediterranean could be seen from its summit. It is an extinct volcano, and its sloping sides are covered with volcanic cones and craters. Its summit is covered with perpetual snow, and the natives of the country affirm that it has never been ascended.

ARK. I. The vessel (Heb. *tebah*) constructed by Noah, according to Gen. vi., for the preservation of his family and of the different species of animals during the deluge. The form of the ark was that of an oblong chest, while its dimensions were 300 cubits in length, 50 in breadth, and 30 in height. Two questions have been raised, with a design to throw discredit on the Biblical account: the first as to the form of the ark, that it was not adapted for floating; the second as to its dimensions, that it was not large enough to answer the purposes for which it was designed. Both to strengthen and to obviate the objections raised, many curious speculations have been resorted to, to prove the basis of calculations, but no valuable results have been attained on either side. II. The ark (Heb. *aron*) of the covenant, or testimony, among the appointments of the Jewish tabernacle and temple. This was built of shittim (acacia wood), inlaid and overlaid with pure gold. Its dimensions were two cubits and a half in length, and one and a half in width and height. Its location was in the holy of holies. The cover of this ark was the mercy seat, over which stood the two cherubim. The contents of the ark of the covenant were, according to 1 Kings viii. 9, exclusively the tables of the law received by Moses (from which the ark had its name); but, according to Heb. ix. 4, it also contained the pot of manna and Aaron's rod, and at a later period probably also a copy of the book of the law. The Jews esteemed this ark peculiarly sacred. It was made to be carried in procession before them in the journey to the promised land, and for this purpose was committed to the care of the Kohathites, and none were permitted to touch it but the tribe of Levi. In war times, after the conquest of Palestine, it sometimes accompanied the army. At the close of the judgeship of Eli it was captured by the Philistines, but subsequently restored. It seems to have perished in the destruction of the temple by Nebuchadnezzar.

ARKANSAS, the name given by the Algonquins to the Ouquapas, a tribe of Indians of the Dakota family. According to Gravier, a Jesuit missionary in Illinois about the year 1700, the Arkansas had previously resided on the Ohio river, whence after a long struggle they were driven down the Mississippi by the Illinois and their allies. This corresponds with the tradition of the Lenni, another Algonquin tribe, as to the Allegewi or Alleghans; and as early French writers use indifferently the term Alkansas or Akansas, the suspicion increases as to their identity. They comprised several divisions known as the Quappas or Kappas, Doginga, Toriman, and Osotteouez or Sothouis. One division, called by the Algonquins Mitchigamias, removed to the country of the Illinois, but subsequently returned. The Arkansas were first visited by Marquette, and from his time were always friendly to the French, welcoming La Salle and Tonti, as well as the survivors of La Salle's last expedition. They refused to join the Natchez against the French, and nearly exterminated the Yazoos, who had massacred the French among them. They were at this time a powerful tribe, able in 1740 to send out 400 warriors, but they soon lost by smallpox and other diseases. The remnant, now called Quapaws, are in the Indian territory west of their former country, and number only 200.

ARKANSAS, a S. W. river of the United States, the largest tributary of the Mississippi except the Missouri. Its extreme sources, which were first explored in 1806 by Lieut. Pike, U. S. A., lie in the Rocky mountains W. of the South Park, in lat. 39° N., lon. 106° W., at an elevation of 10,000 ft. above the sea level, which is reduced one half in the first 150 m. It flows E. through Colorado to near the centre of Kansas, and thence generally S. E. through the Indian territory and Arkansas to its junction with the Mississippi at Napoleon, 275 m. (direct) above New Orleans; length, over 2,000 m. Near its source the river pours with great violence through a deep and narrow fissure in the gneiss rock; after leaving the mountains it traverses a sterile hilly region, sustaining considerable timber. The width of the Arkansas undergoes great variations. From 150 ft. near the mountains, it gradually increases to about a mile as it traverses the sandy desert; and after entering the hilly region it varies from 1,000 to 2,000 ft. Through the prairie region the ordinary depth is about 2 or 3 ft., but there are seasons when the water entirely disappears, being absorbed by the immense beds of sand through which it flows. The range of the river between low and high water is about 45 ft. at Napoleon, 40 at South Bend, 35 at Little Rock, 25 at Fort Smith, and 10 at Fort Gibson, 642 m. from the mouth. It is navigable for steamboats of 3 to 4 ft. draught to a point 40 m. above Little Rock, and during the floods as far as Fort Smith and Fort Gibson. Below Pine Bluff it has been necessary to construct levees to restrain the flood. For a distance of 400 m. from its mouth the Arkansas has many lakes and bayous. Its principal tributary is the Canadian in the Indian territory. The White and Arkansas are connected by a large bayou 6 m. above the junction of the former with the Mississippi, through which the current moves sometimes in one direction and sometimes in another, according to the relative stand of the rivers. The principal points on the Arkansas are Napoleon, Arkansas Post, Pine Bluff, Little Rock, Van Buren, and Fort Smith in Arkansas, and Fort Gibson in the Indian territory.

ARKANSAS, one of the states of the American Union, situated between lat. 33° and 36° 30′ N., and lon. 89° 45′ and 94° 40′ W., having an extent of 240 m. from N. to S., and varying from 170 to 250 m. from E. to W., the narrowest part being on the S. line and the broadest on the parallel of lat. 36° N.; area, 52,198 sq. m. The state is bounded N. by Missouri, E. by the St. Francis river, separating it from Missouri, and the Mississippi, separating it from Tennessee and Mississippi, S. by Louisiana, S. W. by Texas, and W. by the Indian territory. The state is divided into 64 counties, as follows: Arkansas, Ashley, Benton, Boone, Bradley, Calhoun, Carroll, Chicot, Clarke, Columbia, Conway, Craighead, Crawford, Crittenden, Cross, Dallas, Desha, Drew, Franklin, Fulton, Grant, Greene, Hempstead, Hot Springs, Independence, Izard, Jackson, Jefferson, Johnson, Lafayette, Lawrence, Lincoln, Little River, Madison, Marion, Mississippi, Monroe, Montgomery, Nevada, Newton, Ouachita, Perry, Phillips, Pike, Poinsett, Polk, Pope, Prairie, Pulaski, Randolph, St. Francis, Saline, Sarber, Scott, Searcy, Sebastian, Sevier, Sharpe, Union, Van Buren, Washington, White, Woodruff, Yell. There are no large cities. The oldest settlement is Arkansas Post (pop. in 1870, 683), the chief town of Arkansas county, on the river of the same name, about 50 m. above its junction with the Mississippi. It was settled by the French in 1685. Little Rock, Pulaski county, the state capital (pop. 12,380), is also situated on the Arkansas river, about 300 m. above its mouth, in lat. 34° 40′ N., lon. 92° 12′ W. It was founded in 1820, is built on a commanding bluff, and is a place of considerable traffic. The other chief towns are Fort Smith (pop. 2,227), Helena (2,249), Pine Bluff (2,081), Camden (1,621), Hot Springs (1,276), and Princeton (1,142). The population of Arkansas in 1870 was 484,471, of whom 362,115 were whites, 122,169 colored, 98 Chinese and Japanese, and 89 Indians. Of the total population, 479,445 were native born, and 5,026 foreign born. The native population not born in the state were principally from Tennessee, Alabama, Georgia, Mississippi, and North Carolina, while the foreigners were chiefly natives of England, Ireland, and Germany. In population Arkansas ranks 26th among the states. The following table will show the increase in population since 1820, the year after Arkansas was organized as a territory:

State Seal of Arkansas.

Censuses.	White.	Free Col'd.	Slaves.	Total.
1820..........	12,579	77	1,617	14,273
1830..........	25,671	141	4,576	30,388
1840..........	77,174	465	19,935	97,574
1850..........	162,189	608	47,100	209,897
1860..........	324,191	144	111,115	435,450
1870..........	362,115	122,169	......	484,471

In 1870 there were 111,799 persons in the state 10 years old and upward unable to read, and 133,339 unable to write. Of those 21 years old and upward unable to write, 18,610 were white males, 21,770 white females, 23,681 colored males, and 22,689 colored females.—The Ozark mountains, which seldom rise to an elevation beyond 1,500 or 2,000 ft., cross the N. W. corner of the state. They are composed chiefly of limestone, clay slate, sandstone, greenstone, and granite. Extending E. from this range N. of the Arkansas are the Boston mountains, or Black hills. S. of that river is the Masserne or Washita range, which is so barren that the gray sandstone of which it is mainly composed is the prevailing color of the landscape. The eastern portion of the state, bordering on the Mississippi, including a strip ranging from 30 to 100 m. wide, is low and flat, covered by dense forests interspersed with swamps and small lakes or ponds, frequently of stagnant and unhealthy water. This portion is annually overflowed by the floods of the Mississippi, Arkansas, and other rivers. Passing west, the surface gradually rises, and near the centre of the state the country becomes hilly, and the forests are interspersed with rolling prairies. Still further west these hills terminate in the Ozark mountains, and beyond these is an extensive elevated plain continually increasing in height in its course toward the Rocky mountains, in which it finally terminates. The valley of the St. Francis river, in the N. E. part of the state, is a continuous swamp, filled with shallow lakes and bayous, and covered with a heavy growth of cypress, gum, and sycamore, the cypress growing in the water, and the other trees in the marshes or swamps. Rising into the higher land, where the soil is comparatively dry, the surface is covered with a growth of white oak and hickory, with occasional thickly set canebrakes.—Arkansas has no seacoast, but is remarkably favored with navigable streams. The Mississippi river washes its eastern border for a distance of three degrees, though by its tortuous course the actual distance is probably between 300 and 400 m., separating it from Tennessee and Mississippi. The Arkansas river, one of the largest tributaries of the Mississippi, having its source by numerous branches high up in the Rocky mountains, traverses the state by a tortuous route through its centre, the general direction being from N. W. to S. E., for a distance by the course of the stream of about 500 m., and is navigable far above the limits of the state into the Indian territory. The Red river, a large navigable stream which rises in New Mexico, flows through the S. W. corner of the state. The St. Francis river rises at the foot of Iron mountain in Missouri, forms the boundary between Missouri and Arkansas for a short distance, runs through the N. E. corner of the state, and joins the Mississippi about 13 m. above Helena. Although a large river, its navigation is rendered difficult by numerous rafts or snags. For about 50 m. the river spreads out into a lake from 5 to 20 m. wide, supposed to have been produced by a sinking of the earth caused by the great earthquake of 1811. The St. Francis is 450 m. long, and navigable for 150 m. at favorable seasons of the year. White river rises in the N. W. corner of Arkansas, and, after running N. into Missouri, returns into Arkansas, takes a S. E. zigzag course, and flows into the Mississippi. White river is about 600 m. long, and is navigable for small steamers to Batesville, 260 m. from its mouth, and, when cleared of snags and driftwood, may be ascended at favorable seasons at least 400 m. It has numerous tributaries rising in Missouri, the chief of which are the Black or Big Black, Spring, and Cache rivers. The first flows S. and joins White river 30 or 40 m. below Batesville, and is navigable for steamers during the greater part of the year a distance of 100 m. The Washita or Ouachita rises in the W. part of the state, S. of the Arkansas, runs S. and S. E. parallel with that stream, passing through a beautiful and fertile portion of southern Arkansas, thence S. through a portion of Louisiana, and joins the Red river near its junction with the Mississippi. It is navigable for about 350 m. from its mouth. Its chief tributaries are the Little Missouri, Saline, Bayou Bœuf, &c.—The mineral wealth of Arkansas is as yet comparatively undeveloped. It is known that the state abounds in cannel, anthracite, and bituminous coal, which is found in greatest profusion along the banks of the Arkansas river on either side, from a point a short distance above Little Rock to the western boundary of the state. Iron ore of a good quality has been found in the Ozark mountains. Zinc ore exists more extensively in Arkansas than in any other state of the Union except New Jersey. Galena or lead ore, frequently bearing silver, abounds in various parts of the state. Gold has been discovered in White county, but has never been profitably worked. Manganese is abundant, and, according to De Bow, Arkansas contains more gypsum than all the other states in the Union. Near the hot springs in the Washita valley is an immense bed of superior oil stone, or novaculite, said to be equal to the celebrated Turkish oil stone. Salt of very good quality is produced from the saline springs in the vicinity of Washita and elsewhere.—The climate is temperate, but subject to sudden changes in consequence of the north winds. The temperature at Little Rock usually ranges from 15° to 99° F., and averages 62·66°, though the mercury has been known to fall as low as 8°. The mean temperature for the winter months is 45·82°; for the summer, 79·66°, the mercury reaching 90° or above for from 40 to 50 days during the summer. Terrific thunderstorms prevail during the spring and summer. The precipitation of rain during the months of July, August, and September, 1871, amounted to 9·23 inches at Mineral Springs, and 3·75 inches at Clarksville.—The total number of deaths in 1870 was 6,119, of which 2,096 were from general diseases; with respect to local diseases, the most numerous deaths were 639 from affections of the nervous system, 1,476 of the respiratory system, and 602 of the digestive system.—The soil of Arkansas varies from the richest and most productive to the most sterile; and the climate and productions are equally varied. The river bottoms, composed of a black alluvium, are wonderfully fertile, producing bountiful crops of cotton, corn, tobacco, sweet potatoes, melons, peaches, grapes, and various other fruits. There are immense tracts of submerged bottoms equally rich, which might be brought under cultivation by a judicious system of drainage. Rising from the valley, the soil becomes less productive, and in many places will not repay cultivation; while large portions of the uplands, particularly in the northern part of the state, produce good crops of wheat and other grain, as well as the best of apples, and are well adapted to grazing. The uplands are largely interspersed with rolling prairies, which are generally well watered, though Grand prairie, 90 m. long and 30 broad, situated between Arkansas and White rivers, is an exception, being almost entirely without water. The low valleys are destitute of good water, the inhabitants resorting to rain water, which is collected and kept in large tanks sunk into the ground, and filtered river water. These valleys are very unhealthy, particularly to the unacclimated. The more elevated portions of the state are salubrious.—The productions of Arkansas are mainly agricultural. The area of the state is 33,406,720 acres, and in 1870 there were 1,714,466 acres of improved and 3,791,873 of wood land. The cash value of farms was $36,457,476; of farming implements and machinery, $2,112,020; total amount of wages paid during the year, including value of board, $3,907,188. There were 83,952 horses, 33,881 mules and asses, 119,607 milch cows, 31,673 working oxen, 179,431 other cattle, 149,592 sheep, 772,662 swine; value of all live stock $15,795,971. The productions were 683,691 bushels of wheat, 23,422 of rye, 12,208,044 of corn, 486,425 of oats, 46,477 of peas and beans, 399,927 of Irish potatoes, 859,842 of sweet potatoes, 73,021 lbs. of rice, 529,110 of tobacco, 203,275 of wool, 2,531,011 of butter, 12,047 of wax, 261,824 of honey, 221,546 bales of cotton, 6,806 tons of hay, 60,272 gallons of cane and 138,859 of sorghum molasses; value of home manufactures, $723,979; of slaughtered animals, $3,466,152; estimated value of all farm products, including betterments and additions to stock, $36,524,608. The number of manufacturing establishments was 1,364; capital, $2,137,738. Of these the most important were 272 flour and meal mills, 283 establishments for ginning cotton, 35 for the manufacture of leather, 212 saw mills, and 13 wool-carding establishments.—The state is remarkably well stocked with wild animals, valuable for their meat, hides, and furs, among which are the deer, elk, beaver, otter, rabbit, raccoon, wildcat, catamount, wolf, and bear. Wild turkeys, geese, quails, and various other birds, are also found in great abundance.—The chief exports are cotton, maize, wool, hides, and lumber, which find a market in New Orleans, through which port Arkansas receives her foreign merchandise. A thriving domestic commerce is carried on along the Mississippi, Arkansas, and other navigable streams of the state; and the traffic with the Indians on the western border is of considerable importance.—Among the most striking natural curiosities in the state are the famous hot springs, beneficial to those suffering from the effects of mercury in the system, rheumatism, stiffness of the joints, &c. These springs are situated on a small tributary of the Washita, about 6 m. from that river, and 60 m. S. W. of Little Rock, in Hot Springs county. From 75 to 100 of these springs, varying in temperature from 105° to 160° F., issue from a lofty ridge of sandstone overlooking the town, while a number rise from the bed of Hot Spring creek, which flows at the foot of the ridge, and, by reason of the springs, is rendered sufficiently warm for bathing in midwinter. In Pike county, on the Little Missouri river, is a natural bridge, and near by is a mountain of very fine alabaster.—Up to Jan. 1, 1870, only 128 miles of railroad had been completed in Arkansas; but many important lines are now in process of construction. The Cairo and Fulton road extends from Cairo, Ill., S. W. across Arkansas past Little Rock to Fulton in Hempstead county, and thence to the Texas line; 301 m. of this road will lie in Arkansas. The Little Rock, Pine Bluff, and New Orleans road extends from the former city to Napoleon on the Mississippi, a distance of 125 m. The Little Rock and Fort Smith road connects these two points, which are distant 156 m. The Memphis and Little Rock extends from a point opposite Memphis, Tenn., on the Mississippi, to Little Rock, and is 130 m. long. The Mississippi, Ouachita, and Red River road extends from Eunice on the Mississippi westerly to Fulton on the Red river, 155 m. The St. James and Little Rock is projected from St. James, Mo., on the Southern Pacific railroad, 104 m. W. of St. Louis, to Little Rock, a distance of 240 m. The Missouri, Kansas, and Texas extends from Junction City, Kansas, on the Kansas Pacific railroad, to Fort Smith, Ark., 325 m. The Memphis and St. Louis extends from Wakefield, opposite Memphis, northerly to Morley, Mo., 142 m., with a branch extending southerly to Helena, 60 m. Under the act of 1868 the number of miles of railroad for which state aid could be granted was limited to 850. The bonds, of the denomination of $1,000, are payable in 30 years, with 7 per cent. interest payable semi-annually in New York city. The amount of aid awarded to the various companies up to Jan. 1, 1871, is as follows:

NAMES OF ROADS.	Entire length of line.	Miles graded.	Miles of state aid awarded.	Rate per mile.	Amount of state aid awarded.	Amo'nt of stock in road held by state.
Memphis and Little Rock	130	118	120	$10,000	$1,200,000	$40,000
Little Rock and Fort Smith	156	95	150	10,000	1,500,000	38,125
Little Rock, Pine Bluff, and New Orleans	125	45	120	15,000	1,800,000	none.
Missouri and Ohio Railroad	160	45	130	15,000	1,950,000	210,500
Cairo and Fulton	301	20	300	10,000	3,000,000	......
Little Rock and Helena	98	..	30	15,000	450,000	......
Total	970	323	850		$9,900,000	$288,625

The amount of state bonds actually issued to railroad companies to Sept. 30, 1870, was $2,750,000. Pursuant to an act of the legislature of 1869, 53 m. of levee work have been completed upon the rivers of the state, at a total cost of $505,917, and 167 m. are in course of construction, comprising levees, railroad beds answering the same purpose, cut-offs, and other works securing land from overflow. By these improvements many acres of valuable land will be reclaimed. In 1870 there were two national banks in Arkansas, with a total capital of $200,000 and a circulation of $179,500.—The present constitution of Arkansas was adopted Feb. 11, 1868, and ratified by the people March 13, 1868. The equality of all persons before the law is recognized. The ordinance of secession of 1861 and the state debt contracted in waging war against the federal government are declared null and void. The legislature, which assembles biennially on the first Monday of January (odd years), consists of a house of representatives of 82 members chosen for two years, and a senate of 26 members elected for four years. One half of the senators are chosen every two years. Representatives must be male citizens of the United States not less than 21 years old, must have resided in the state for one year, and be qualified electors and residents of the districts from which they are elected. In addition to these qualifications senators must have attained the age of 25 years. No person holding a federal, state, or county office, with certain exceptions, is eligible as a member of the legislature. A majority of the members elected to each house is sufficient to pass a bill over the governor's veto. Provision is made for taking the census in 1875, and every ten years thereafter; and immediately after every census, state or federal, the legislative districts may be rearranged. The executive power is vested in a governor, lieutenant governor, secretary of state, auditor, treasurer, attorney general, and superintendent of public instruction, who are chosen by the people for a term of four years. The governor must be not less than 25 years of age, a citizen of the United States for five years, an elector and a resident of the state for one year. His salary is $5,000. No member of congress or person holding a federal or state office is eligible as governor. The executive appoints a commissioner of public works and internal improvements, who is also *ex officio* commissioner of immigration and state lands. The judicial power is vested in a supreme court, 10 circuit courts, and such inferior courts as the legislature may establish. There is a separate chancery court at Little Rock for Pulaski county. The supreme court consists of a chief justice appointed by the governor with the consent of the senate for eight years, and four justices elected by the people for eight years, two being chosen every four years. The judges of the circuit and inferior courts are appointed by the governor with the consent of the senate for six years. Two justices of the peace are elected in each township for two years. General elections are held by ballot biennially on the Tuesday next following the first Monday in November. Every male citizen of the United States, or person who has declared his intention to become a citizen, who has attained the age of 21 years and resided in the state six months next preceding the election, and who is an actual resident of the county in which he offers to vote, is qualified as an elector, except soldiers, sailors, and marines in the United States service stationed in Arkansas, criminals, idiots, the insane, and the following classes: 1, those who during the civil war took the oath of allegiance or gave bonds for loyalty and good behavior to the United States government, and afterward gave aid, comfort, or countenance to those engaged in armed hostility to the federal government; 2, those disqualified as electors or from holding office in the state from which they came; 3, those persons who during the civil war violated the rules of civilized warfare; 4, those who may be disqualified by the 14th amendment to the federal constitution, or by the reconstruction acts of congress. All persons included in the above classes who have openly advocated or have voted for the reconstruction measures of congress, and accept the equality of all men before the law, are deemed qualified electors under the constitution. The general assembly is empowered to remove by a two-thirds vote of each house, approved by the governor, the political disabilities from any person who has in good faith returned to his allegiance to the federal government, except in the case of those who after the adoption of this constitution continued their opposition to the reconstruction measures of congress. A registration of voters is to be made before every general election. All persons before registering or voting must take an oath never to countenance secession, to accept the civil equality of all men, and never to injure or countenance others in injuring any person on account of past or present support of the government of the United States, or the principle of equal rights, or affiliation with any political party. The constitution requires the general assembly to maintain a system of free schools, and enforce the attendance of every child between 5 and 18 years of age for a term equivalent to three years, unless educated by other means. A free school must be kept in each school district for not less than three months during the year. The legislature is also required to establish and maintain a state university, with departments for instruction in teaching, agriculture, and natural sciences, as soon as the public school fund will permit. Liberal provisions are made for the protection of homesteads, and of the separate property of married women; and taxes are limited to 2 per cent. of assessed value.—The funded and unfunded debt of the state, principal and accrued interest, amounted on Jan. 1, 1870, after deducting estimated assets, to $4,522,297 77, the annual interest on which is about $300,000. The receipts and expenditures of the principal funds from July 3, 1868, to Sept. 30, 1870, were: General revenue—receipts, $1,110,483 43, including $286,703 57 on hand at former date; disbursements, $327,777 06; school fund—receipts, $429,449 90, including $64,875 32 on hand; disbursements, $370,454 95; permanent school fund—receipts, $35,591 74; disbursements, $399 25; military fund—receipts, $70,302 20; disbursements, $970 84; sinking fund—receipts, $142,382 20; disbursements, $43,779 91; excess fund—receipts, $108,932; disbursements, $2,368 23. According to the census of 1870, the assessed value of real estate was $53,102,304; personal property, $31,426,539; true value of real and personal estate, $156,394,691; total taxation not national, $2,866,890. At present the state tax amounts to 9½ mills on the dollar, of which 5 mills are for general purposes, 2 mills for school purposes, and 2½ mills for the payment of interest on the public debt.—The present system of free public schools was established in 1868. The number of children of school age in 1870 was 180,274; attending school, 107,908; teachers employed, 2,302; number of teachers' institutes, 41; teachers attending institutes, 944; whole amount paid teachers in 1870, $405,748; number of school houses built in 1869 and 1870, 657; persons subject to per capita tax of $1 in 1869, 79,544; per capita tax collected in 1869, $61,465; number of schools taught in 1870, 2,537. The second apportionment of the school fund, based on the school tax for 1869, was made in 1870, and amounted to $187,427 08. The common school fund on Oct. 1, 1870, amounted to $58,954 95, and the permanent school fund to $35,192 49. In 1868 the legislature accepted the grant of land, amounting to about 150,000 acres, made by congress in 1862 toward the support of a college of agriculture and the mechanic arts, and provided for the creation of the Arkansas industrial university, not yet established.—Among the state institutions, all at Little Rock, are the institute for the blind, having 38 pupils in 1868; the deaf mute institute, with 48 pupils in 1870; and the penitentiary, with 199 prisoners in 1870. There are published in the state 4 daily, 2 tri-weekly, and 41 weekly papers, and 4 monthly periodicals. The average circulation of each issue is 650, and the aggregate annual circulation 2,438,716.—Arkansas was originally a portion of the territory of Louisiana, purchased from the French in 1803. It remained a part of Louisiana territory till 1812, when the present state of Louisiana was admitted to the Union, and the remaining portion was organized as Missouri territory, which name it held till 1819, when Missouri formed a state constitution and Arkansas was erected into a territory bearing its present name. It remained under a territorial government till June, 1836, when a constitution was formed at Little Rock, and Arkansas became a state. In January, 1861, the people decided by a vote of 27,412 to 15,826 in favor of a convention to consider the question of secession. That body assembled in March, and deferred the decision to a popular election to be held in August. Meanwhile the state authorities seized the arsenals at Little Rock (Feb. 8) and Napoleon (April 24), and upon Fort Smith on the western border (April 23). The convention reassembled May 6, in consequence of President Lincoln's call for troops, and passed the ordinance of secession by a vote of 69 to 1, withdrawing the submission of the question to the people. The battle of Pea Ridge, or Elk Horn, in N. W. Arkansas, was fought March 6 and 7, 1862, between the confederates under Van Dorn and the Union forces under Curtis, and resulted in a victory of the latter, who then advanced to the Mississippi and occupied Helena. On Dec. 7, 1862, the confederate general Hindman, attempting to prevent the junction of Gens. Blunt and Heron, was defeated by Blunt at Prairie Grove near Fayetteville, with a loss of about 1,200. Arkansas Post, on the Arkansas river, was captured by Gen. McClernand and Admiral Porter, Jan. 11, 1863. The confederates under Holmes attempted to retake Helena July 4, but were defeated by Gen. Prentiss. Little Rock was taken by an expedition commanded by Gen. Steele, Sept. 10, without serious resistance, while the W. and S. parts of the state were occupied by Blunt and Stephenson, Holmes being driven into Texas; but the confederates recovered possession of most of the southern counties after the reverse of Gen. Banks in Louisiana (April, 1864). On Oct. 30, 1863, a meeting of loyal citizens representing about 20 counties was held at Fort Smith to institute measures for reorganizing the state government. A convention assembled at Little Rock Jan. 8, 1864, when representatives from 42 counties were present, and framed a loyal constitution. At an election held on March 14, 15, and 16, 12,177 votes were cast for the constitution and 226 against it. State and county officers, representatives in congress, and members of the legislature from 40 counties were elected; and in April a state government was organized. During 1865 much suffering and destitution prevailed among the people, and in May the federal government issued 75,097 rations to refugees and 46,845 to freedmen. Under the reconstruction act of March 2, 1867, declaring that "no legal state governments or adequate protection for life or property now exists" in the states lately in rebellion, Arkansas and Mississippi were constituted the fourth military district. A registration of voters was made under instructions from Gen. Ord, and delegates were elected in November to a constitutional convention which assembled at Little Rock Jan. 7, 1868. The new constitution was ratified by a small majority of the people in March. On June 22 congress passed over the president's veto a resolution admitting Arkansas to representation, and the administration was thereupon transferred to the civil authorities. On Nov. 9, 1868, Gov. Clayton declared 10 counties in a state of insurrection. On March 22, 1869, martial law ceased in the state. The 14th amendment to the federal constitution was ratified in April, 1868, and the 15th in March, 1869. (See supplement.)

ARKANSAS, a S. E. county of Arkansas, bounded E. by White river and intersected by the Arkansas; area, about 1,200 sq. m.; pop. in 1870, 8,268, of whom 4,212 were colored. The surface is level, and about one third of it is occupied by the Grand prairie, the largest in the state, and very fertile. The county in 1870 produced 217,450 bushels of Indian corn, 17,327 of Irish and 28,598 of sweet potatoes, and 12,315 bales of cotton. Capital, Arkansas Post.

ARKWRIGHT, Sir **Richard**, an English inventor, born at Preston, Lancashire, Dec. 23, 1732, died at Cromford, Derbyshire, Aug. 3, 1792. He was the youngest child of a family of 13, and his parents were too poor to give him any education. He earned his living as a barber, shaving in a cellar for a penny, till he was 28, when he became a dealer in hair, and invented a dye by the sale of which he accumulated a little property. His first experiments in mechanics were attempts to solve the problem of perpetual motion; but he soon directed his attention to improvements in the cotton manufacture. At that time English cottons were made with only the weft of cotton, the warp being of linen, and it was considered impossible to spin cotton fine and strong enough for the warp. Moreover, the supply of weft was short of the demand, though Hargreaves of Lancashire had shortly before invented his jenny, and had several machines at work in Nottingham. In 1768 Arkwright produced the model of his famous cotton-spinning frame, by which the thread could be spun of any required fineness and strength and with immense velocity. Fearing the same hostility that had driven Hargreaves out of Lancashire, he proceeded at once to Nottingham. There he met with Messrs. Wright, bankers, who engaged to furnish the capital necessary to perfect the invention, but soon became frightened and retired. Arkwright then applied to Messrs. Need and Strutt, and the latter (the celebrated inventor of the stocking frame) saw at once the value of the invention, and the firm took an interest in it. Arkwright was profoundly ignorant of mechanics, but a few suggestions of Mr. Strutt about the wheel work overcame the last difficulty, and a machine driven by a horse was soon in operation. In 1771 another mill, driven by water power, was established at Cromford, in Derbyshire. The first patent was granted in 1769, and unsuccessfully contested in 1772. In 1775 Arkwright obtained a new patent for improvements, but it seems he had included in it things discovered before, and six years later it was declared void by the courts; but in 1785 he obtained a decision in his favor, and was reinstated in the monopoly. The object of Arkwright's invention was to spin cotton fine, with a hard twist, and fit for warp. This was done by the use of drawing-rollers, by sets of two, the second set moving faster than the first, and by a fast-revolving spindle giving a twist to the cotton as it came out from between the second pair. The introduction of this machine, which was far superior to that of Hargreaves, caused the latter to die of grief. Arkwright encountered the bitterest hostility, not so much from the working class as from the manufacturers, who at one time even refused to buy his yarns, and tried to ruin him by mischievous legislation in parliament. His energy and perseverance, however, triumphed over all obstacles. In the management of his mill he showed a remarkable capacity for organization, and his labors were rewarded with a fortune of £500,000. He acquired the rudiments of learning after he was 50 years old, was knighted in 1786 on occasion of presenting an address to the king, and in 1787 served as high sheriff of Derbyshire. His invention enables one man to do as much work as 130 could do before, and it is calculated that 40,000,000 hands would scarcely be sufficient to accomplish the spinning now done by machinery in England alone.

ARLES (Celtic *Ar-lait*, near the waters; Lat. *Arelate*), a town of France, in Provence, department of Bouches-du-Rhône, on the left bank of the lower Rhône, at the point where the river divides and forms the island of Camargue, 46 m. N. N. W. of Marseilles; pop. in 1866, 26,367. It is an ill-built and somewhat unhealthy place, though situated amid beautiful environs. Its ancient amphitheatre, although not as well preserved as that of Nîmes, is superior in size and magnificence. An obelisk, consisting of a single block of granite about 50 feet high, is yet standing on one of the public thoroughfares, while the ruins of an aqueduct, of two temples, of a triumphal arch, an extensive cemetery, and numerous fragments of granite and marble columns, are to be seen in different parts of the city. The statue known as the Venus of Arles, a rival to the Venus de' Medici, now in the national museum of Paris, was discovered here in 1651. The Roland tower and the Byzantine church of St. Trophimus deserve mention, as also the town hall, designed by Mansard. Arles contains a school of navigation, a college, a collection of natural history, a museum of antiquities, a public library, and a theatre. Silk, soap, and glass bottles are manufactured, and the sausages of Arles are held in high esteem.—The ancient Arelate was an important town at the time of Cæsar's invasion, became a prosperous Roman colony, was for a time the residence of Constantine, became the capital of the Gothic king Euric, was plundered by the Saracens in 730, and 150 years later became the capital of Cisjurane Burgundy, and in 930 of both Cisjurane and Transjurane Burgundy, united as the kingdom of Arelate or Arles. (See BURGUNDY.) In 1251 it came into the possession of Charles of Anjou, count of Provence. It was united to the crown of France under Louis XI. Several important ecclesiastical synods were held here in the 4th and 5th centuries.

ARLINCOURT, Victor, viscount d', a French poet and novelist, born in 1789, died Jan. 22, 1856. His father, a farmer of the public revenue, died by the guillotine in the revolution. Victor commended himself to Napoleon's notice by publishing in 1810 an allegorical poem in his honor, entitled *Une matinée de Charlemagne*, for which he was rewarded with two court offices. He afterward undertook an epic, the hero of which was still Charlemagne, or rather Napoleon, but it was unfinished on the fall of the empire. D'Arlincourt easily transferred his political allegiance to the Bourbons, but did not meet with favor from Louis XVIII. The publication of his *Caroléide* was soon followed by several novels, *Le Solitaire*, *L'Étrangère*, *Le Renégat*, *Ipsiboé*, and *Ismalie*, the last being in rhyme. These eccentric works acquired an equivocal sort of celebrity, *Le Solitaire*, of which Charles the Bold was the hero, having been translated into several languages and widely circulated. His tragedy, *Le Siège de Paris*, played at the Théâtre-Français, was received with such bursts of laughter that the actors did not attempt a second performance. In the latter part of his life he fell into obscurity.

ARLON (anc. *Orolaunum*), a town of Belgium, capital of the province and 16 m. W. N. W. of the city of Luxemburg; pop. in 1867, 5,779. It is situated in the midst of forests on a ridge of the Ardennes, and is rapidly increasing in prosperity owing to its ironware, leather, and other manufactures. It was known to the Romans. At the end of the 18th century it was the scene of various engagements between the Austrian and French armies.

ARMADA, Spanish, the great naval armament sent by King Philip II. of Spain, in 1588, for the conquest of England. The fullest account of this armament is given in a book published about the time it set sail by order of Philip, under the title *La felicisima Armada que el rey Don Felipe nuestro Señor mandó juntar en el puerto de Lisboa* 1588, *hecha por Pedro de Paz Salas.* A copy of this work was procured for Lord Burleigh, so that the English government was beforehand acquainted with every detail of the expedition. (This copy, containing notes up to March, 1588, is now in the British museum.) The fleet is therein stated to have consisted of 65 galleons and large ships, 25 *urcas* of 300 to 700 tons, 19 tenders of 70 to 100 tons, 13 small frigates, 4 galeasses, and 4 galleys; in all, 130 vessels, with a total tonnage of 75,868 tons. They were armed with 2,431 guns, of which 1,497 were of bronze, mostly full cannon (48 pdrs.), culverines (long 30 and 20 pdrs.), &c.; the ammunition consisted of 123,790 round shot and 5,175 cwt. of powder, giving about 50 rounds per gun, at an average charge of 4½ lbs. The ships were manned with 8,456 sailors, and carried 19,295 soldiers and 180 priests and monks. Mules, carts, &c., were on board to move the field artillery when landed. The whole was provisioned, according to the above authority, for six months. This fleet, unequalled in its time, was to proceed to the Flemish coast, where another army of 30,000 foot and 4,000 horse, under the duke of Parma, was to embark, under its protection, in flat-bottomed vessels constructed for the purpose, and manned by sailors brought from the Baltic. The whole were then to proceed to England. In that country Queen Elizabeth had, by vigorous exertions, increased her fleet of originally 30 ships to about 180 vessels of various sizes, but generally inferior in that respect to those of the Spaniards. They included a large number of privateers, armed merchantmen, and vessels furnished by the nobility, and were manned by 17,500 sailors. They were wretchedly provisioned, and so ill supplied with ammunition that they could hardly have made a serious fight but for the powder which they captured from the enemy. The English military force was divided into two armies: one, of 18,500 men, under the earl of Leicester, for immediately opposing the enemy; the other, of 45,000, for the defence of the queen's person. According to a MS. in the British museum, entitled "Details of the English Force assembled to Oppose the Spanish Armada" (MS. Reg. 18th, c. xxi.), 2,000 infantry were also expected from the Low Countries. The armada was to leave Lisbon in the beginning of May, but, owing to the death of the admiral Santa Cruz and his vice admiral, the departure was delayed. The duke of Medina Sidonia, a man totally unacquainted with naval matters, was now made captain general of the fleet; his vice admiral, Martinez de Recalde, however, was an expert seaman. Having left Lisbon for Corunna for stores, May 29, 1588, the fleet was dispersed by a violent storm, and, though all the ships joined at Corunna with the exception of four, they were considerably shattered, and had to be repaired. Reports having reached England that the armament was completely disabled, the government ordered its own ships to be laid up; but Lord Howard, the admiral, opposed this order, set sail for Corunna, learned the truth, and on his return continued warlike preparations. Soon after, being informed that the armada had hove in sight, he weighed anchor, and as it passed Plymouth, July 31, stood out in its rear and opened a destructive fire. Having the windward position, and being greatly superior in speed, he was able to inflict serious damage without loss to himself. All the way along the channel the English followed the armada with the same tactics, taking skilful advantage of the changing winds, harassing the Spaniards, capturing two or three of their best vessels, and yet keeping all the while virtually out of reach. The Spaniards proceeded toward the coast of Flanders, keeping as close together as possible. In the various minor engagements which took place, the English always won the victory over the clumsy and undermanned Spanish galleons, crowded with soldiers. The Spanish artillery, too, was very badly served, and almost always planted too high. Off Calais the armada cast anchor, waiting for the duke of Parma's fleet to come out of the Flemish harbors; but Parma had nothing but unarmed barges, and could not come out until the armada had beaten off the Anglo-Dutch blockading squadron. Driving the Spaniards out of Calais roads by means of fire ships, Aug. 8, Howard and Drake now forced them toward the Flemish coast, with the purpose of getting them into the North sea and cutting off their communications with Dunkirk. The battle began at daybreak off Gravelines, and lasted till dark. The Spaniards were completely defeated. Several of their largest ships were lost, and 4,000 men were killed, and probably at least as many more wounded. It was impossible either to return to Calais or to reach the duke of Parma. The provisions were nearly exhausted, and the English fleet, apparently little injured, still hovered on their weather beam. It was imperative that they should return to Spain for fresh stores. The passage through the channel being closed by the English fleet, the Spaniards, now counting 120 vessels, undertook to round Scotland and Ireland. But in the neighborhood of the Orkneys they were dispersed by a storm. Some of them foundered. About 30 were afterward wrecked on the W. coast of Ireland. Those of the crews who escaped to shore were killed generally, and it was calculated that about 14,000 thus perished. The remnant which reached Spain in September and October, with Sidonia and Recalde, numbered only 54 vessels and 9,000 or 10,000 starving men.

ARMADILLO (*dasypus*, Linn.), a genus of the class *mammalia* and order *edentata*, forming a small family, intermediate between the sloths and ant-eaters, and having an affinity to the families *chlamyphorus* and *oricteropus*. They are distinguished by the possession of molar teeth only. The armadillos have a singular coat armor covering their whole body and head. It consists of three bony bucklers, composed of small polygonal plates set in juxtaposition to one another, but neither connected by joints nor separately movable. The bucklers which cover the rump and shoulders of the animal, each forming as it were a single solid piece, are capable of little pliancy or motion save what is allowed during the life of the animal by the partial elasticity of the thin shell or crust lubricated by the animal oils which penetrate it. These bucklers, however, are connected by a number of transverse movable bands, composed of similar plates with the principal bucklers, which are themselves connected by the soft and pliant inner skin of the animal, and thus admit of the most rapid motions, being situated immediately above the loins. The buckler or helmet which defends the head has no connection of any sort with the armor of the shoulders, so that the neck is left perfectly free, while it is at the same time completely protected by the projection of the skull-piece. The legs of the armadillos are extremely short and stout, covered with scaly plates, furnished with powerful claws for burrowing in the ground, and guarded as far as the knees by the defending bucklers; these descend so low as to make a complete defence to the belly of the animal, which is covered only with a rough skin, from which originate a few long coarse hairs, and a partial one to the thighs and knees. Except in one species, the armadillos are devoid of hair, save that above mentioned, and a few straggling bristles, which proceed from the inner skin, between the jointed plates of the lumbar region. The tails of all the species but one are armed with annular bands similar to those connecting the bucklers, and in all are adapted to a notch cut out of the posterior buckler in order to receive them. The teeth of the armadillos are of simple cylindrical form, varying from 7 or 8 to 17 or 18 in number, on each side of each jaw, and when the mouth is closed shut one into another. The different species have 4 or 5 toes on their fore feet, and invariably 5 on their hind feet. Their eyes are small, their ears erect and pointed, and they have elongated snouts. They are mostly nocturnal in their habits, though a few of the species go abroad by day; perfectly inoffensive; are never known to bite, or attempt any defence; but when pursued immediately commence burrowing, which they do with such power and rapidity that they easily evade their pursuers. The ordinary food of armadillos consists of fallen fruits, roots, worms, ants, and carrion. Their grinding teeth enable them to feed only on soft substances, and therefore they can devour flesh only when putrid. Abundance of this food they find at all seasons on the pampas of South America, where cattle are slaughtered for the sake of their hides alone. On this food the armadillos become immensely fat, when they are esteemed a great delicacy and are served up roasted whole in their shells.—The armadillos are arranged by Cuvier in five small groups, according to the arrangement of their teeth, toes, and other structural differences: 1. The cachicames, with 4 anterior toes, 7 teeth on a side, above and below, a pointed muzzle, and a long, annulated tail. 2. The aparas, with toes and tail as the last species, but with 9 or 10 teeth on each side, above and below. This animal has also the power of rolling itself into a ball like a hedgehog. 3. The encouberts, with 5 anterior toes and 9 or 10 teeth, throughout. In addition, however, they have 2 teeth on the intermaxillary bones of the upper jaw resembling incisors, in which they differ not only from all armadillos, but from all the order *edentata*. 4. The kabassous, which have 5 toes both before and behind, but the claws obliquely arranged, so as to give them unusual power in burrowing and clinging to the soil when seized. They have 9 or 10 teeth, throughout; and their tails are undefended by armor, as in the other species. 5. The priodontes, or last subdivision of the armadillos, in addition to the unequal toes and enormous claws of the kabassous, have

Armadillo (Dasypus sexcinctus or D. encoubert).

from 22 to 24 small teeth, throughout, on each side of both jaws. Of the cachicames, or first division, there are three species, of which the commonest is the *dasypus peba*, or black tatu of Paraguay. It is about 16 inches long, and was originally known under the appellations of the 7, 8, and 9-banded armadillo, three species being made out of one. The other species of this group are the mule tatu, so called from the length of its ears, and the tatu verdaduro, hardly distinguishable from the last, except by the breadth of the movable bands and the size of the croup buckler. Of the aparas, there is but one species, the mataco, which has in general but 3 bands and a short, blunt tail, covered by a single horny crust. The encouberts have three species: the poyou, or yellow-footed armadillo, which has usually but 7 or 8 movable bands, and is easily known by its triangular snout, flat body, and short legs; the hairy armadillo, remarkable for its more copious growth of bristles from between the movable bands, and for its practice of burrowing into the bodies of dead horses, and remaining within them until all the flesh is consumed, and nothing left but the skeleton and hide; and lastly the pichiy, which is the smallest of all the armadillos. The kabassous have but one species, the tatouay, or wounded armadillo, so called by the Indians from an idea that the scaly covering of its tail, which is naked and looks raw, has been torn off by violence. The last subdivision of armadillos, the priodontes, has likewise but one species, the *dasypus gigas*, or great armadillo of Cuvier. It is remarkable for its size, being 3 feet 3 inches long; for its movable bands, 12 or 13 in number, composed of rectangular plates; for the thickness of its tail at the base; and for the spiral lines of the scales by which it is defended. All the armadillos are inhabitants of Central and South America, being found dispersed from Mexico, over the pampas of Buenos Ayres, and south as far as Paraguay. The armadillo runs with remarkable speed, easily outstripping a man. Although the females in no species have more than 4 mammæ, and in some but 2, they invariably produce 6, 8, or 10 young at a birth, bearing but once in a season.

ARMAGEDDON (Heb. *har*, hill, and *Megiddo*), the name probably given to the whole table land of Esdraelon in Galilee and Samaria, from the town of Megiddo, which stood near the centre of it, upon the site, according to Dr. Robinson, of the modern Lejjun (the Roman Legio). Armageddon was the great battlefield of Palestine. On this elevated plain were fought the battles of the Kishon, Jezreel, Gilboa, and Megiddo. The fame of this field of many battles explains the passage (Rev. xvi. 14–16) in which the seer of the Apocalyptic vision describes God as summoning his foes to "a place called in the Hebrew tongue Armageddon," to the battle of the "great day of God Almighty."

ARMAGH. I. A county of northern Ireland, in the province of Ulster, between Lough Neagh on the north and the county of Louth on the south; area, 512 sq. m.; pop. in 1871, 171,355. In the S. W. part are several groups of inconsiderable mountains; the rest of the surface is level or undulating, and the soil is generally fertile. The principal rivers are the Blackwater and the Bann. The northern and central portions of the county are divided into small farms; grain, vegetables, and flax are their products. Linen weaving is the chief manufacturing industry. The principal towns are Armagh and Newry; part of the latter lies also in the county of Down. Portadown and Lurgan are noted for their linen manufactures. II. A city, capital of the preceding county, situated on the Callam, an affluent of the Blackwater, 36 m. by railway W. S. W. of Belfast; pop. in 1871, 8,952. It is well built round a hill, from the centre of which rises the famous old cathedral, recently repaired and occupying the site of the original building erected by St. Patrick. The town is supplied with water from an adjoining reservoir and is lighted with gas. The Anglican and Roman Catholic archbishops of Armagh both bear the title of primate of all Ireland. The trade chiefly consists in grain, flax yarn, and linen. It has several branch banks, and lively weekly corn and general markets, and the prosperity of the town is rapidly increasing. Between the 5th and 9th centuries Armagh was a renowned ecclesiastical and intellectual centre, and subsequently it was often devastated by the Danes. After the English invasion it was almost uninterruptedly under Irish rulers up to the reformation, after which period it became the scene of many conflicts between the English and Irish forces till the beginning of the 17th century. The military headquarters, formerly in Armagh, have been removed to Belfast.

ARMAGNAC, an ancient territory of France, in the province of Gascony, now forming the department of Gers, and a part of Lot-et-Garonne, Tarn-et-Garonne, and Haute-Garonne. It was successively included in Aquitaine, in the duchy of Gascony, and in the county of Fésenzac, and was erected into a separate county in 960. Its rulers during the 14th and 15th centuries became very powerful. Louis XI. united it to the crown in 1481, but it was restored by Charles VIII., reunited to the crown on the death of the last count in 1497, and, after new changes, descended to Henry of Navarre, who incorporated it with the kingdom of France on his accession in 1589. Louis XIV. gave the title to Henry of Lorraine in 1645, and it was borne by his descendants until the revolution. Of the ancient counts of Armagnac, the most distinguished were the following: I. **Bernard VII.**, killed June 12, 1418. He distinguished himself in the war with the English in Guienne. When the murder of Louis, duke of Orleans, brother of Charles VI., by the emissaries of John the Fearless, duke of Burgundy, left the Orleanists without a chief (1407), he married his daughter to young Charles of Orleans, became the leader of the faction which henceforth assumed the name of Armagnac, and was appointed by the queen constable of France. He succeeded in seizing on Paris, which he governed with an iron rule. At last the Parisians became tired of his tyranny, and by treason delivered the city into the hands of L'Isle-Adam, one of the Burgundian chiefs. Bernard hid himself, but was betrayed by a mason in whom he had confided, and was imprisoned. A few days later the jails were mobbed by the populace, when all the Armagnacs were murdered, Bernard among the rest. **II. Jean V.,** grandson of the preceding, born about 1420, assassinated in 1473. He made himself notorious by his uncontrollable passions, and publicly married his own sister, Jeanne Isabelle, who had been engaged to King Henry VI. of England. This crime was made a pretext by Charles VII. for depriving him of his possessions, which were afterward restored to him by Louis XI. Notwithstanding this, Jean entered the league of the public weal against Louis, and was driven into Aragon; but by the aid of Louis's brother, the duke of Guienne, he recovered his estates, and withstood a siege in the castle of Lectoure. The royalists obtained an entrance by stratagem, put the count to death, and forced his wife to drink of a poison which killed both herself and her unborn child.

ARMAND, Charles. See Rouarie, Marquis de la.

ARMANSPERG, Joseph Louis, count, a Bavarian statesman, regent of Greece, born in Lower Bavaria, Feb. 28, 1787, died April 3, 1853. In the war of 1813-'14 he was commissioner of Bavaria in the allied army, and belonged to the board which governed the conquered regions on the Rhine. He participated in the congress of Vienna in 1815, was one of the plenipotentiaries with the allied army during the occupation of France, and administered a large district of that country. In 1825 he was chosen president of the chamber of deputies, and became leader of the moderate opposition. King Louis I. made him secretary of the treasury and of foreign affairs. He was one of the founders of the German Zollverein. By his opposition to the ultramontanes he forfeited the confidence of the king, and retired into private life, but in 1832 was recalled to take the regency of Greece during the minority of King Otho. He entered Greece in February, 1833, and ruled until 1837 with almost limitless power. His administration was in many respects beneficial, but he finally became unpopular with the nation, the sovereign, and all the foreign diplomatists except the English minister, and was dismissed.

ARMATOLES, Christian captains commanding bands of klephts or brigands, who, after the establishment of the Ottoman empire in Europe, succeeded in maintaining themselves independent in the possession of inaccessible mountain defiles. These warlike chiefs, constantly striving for the independence of Greece, became more and more formidable, especially in Epirus and other parts of northern Greece; and about the beginning of the 17th century the pashas were obliged to treat with them, and admit their right to govern their mountain country. They took a leading part in the Greek revolution; and among the armatolic chieftains most distinguished in this war were Eustrates, Gogo, Makry, Saphacas and Karaiskakis (both of whom perished under the walls of Athens in 1827), Kaltzodemos (killed before Missolonghi), Odysseus, Panuryas, and Marco Bozzaris, the commander of the Suliotes.

ARMENGAUD, Jean Germain Désiré, a French art historian, born at Castres, department of Tarn, in 1797, died at Passy, near Paris, in March, 1869. He is the author of *Histoire des peintres de toutes les écoles depuis la renaissance jusqu'à nos jours* (1849, completed by Charles Blanc), *Les galeries publiques de l'Europe* (1856), *Les chefs d'œuvres de l'art chrétien* (1858), *Les trésors de l'art* (1859), *Le Parthénon de l'histoire* (1863-'4), and other illustrated works.

ARMENTIÈRES, a town of France, in the department of Le Nord, situated on the Lys, opposite the Belgian frontier, 10 m. N. E. of Lille; pop. in 1866, 15,579. It has a college, an insane asylum, and important manufactures of linen and cotton goods. Formerly the town was fortified, but after its conquest by Louis XIV. the works were razed.

ARMENIA, an inland region of western Asia, mostly within the present limits of Asiatic Turkey, but extending into the adjacent dominions of Russia and Persia. Its boundaries have varied greatly at different periods, and are not now authoritatively fixed, estimates of its area varying from 50,000 up to 150,000 sq. m. In its largest sense, it formerly reached toward or to the Caucasus mountains on the N., nearly or quite to the Caspian sea on the E., included (according to some) the modern lake of Urumiah on the S. E., and embraced a part of Cappadocia on the S. W. and W.; thus extending from about lon. 36° to 49° E. and from about lat. 37° to 42° N. Armenia Minor or Lesser Armenia lay W. of the Euphrates, and was the eastern part of Asia Minor; Armenia Major or Greater Armenia, usually called simply Armenia, sometimes Armenia Proper, lies entirely E. of the Euphrates. In its most flourishing period Armenia was divided into 15 provinces and 187 cantons or subdivisions, the central province being Ararad or Ararat. Armenia Major is an elevated and mountainous region, watered with abundant rains, and covered for some months in the year with deep snows. Its climate is severe for its latitude, which is that of New Jersey and Delaware, but is generally healthy. Its winter lasts from October to May; its summer is short and warm. It has five principal rivers: the Euphrates and Tigris, which unite and flow into the Persian gulf; the Kur (anciently Cyrus) and Aras (Araxes), which unite and fall into the Caspian sea; and the Tchoruk (anciently Acampsis), which falls into the Black sea. A high table land, 4,000 to 8,000 ft. above the sea, constitutes a considerable part of the country, and is supposed to have been once a large inland sea, from which the Taurus, Antitaurus, and other mountains were upheaved by volcanic action. Its highest mountain is the Great Ararat, which rises more than 3 m. above the level of the sea, and is covered with perpetual ice and snow. An eruption of Ararat and disastrous earthquakes occurred in 1840. Traces of volcanic action abound through a large part of this whole region. Among its rocks are trap, porphyry, basalt, granite, syenite, limestone, sandstone, &c. It has mines of gold, silver, lead, iron, copper, and rock salt. Its largest lake, Van, is salt, nearly 5,500 ft. above the sea, with an area of about 1,400 sq. m. The lake of Urumiah is also salt, but is not generally included in Armenia. The lake of Sevan in Russian Armenia is sometimes called "sweet sea," to distinguish it from the salt lakes. The agricultural resources of Armenia are good, but, in consequence of misgovernment, much of the land is unimproved. There are rich pastures; some parts yield abundantly grain, tobacco, manna, hemp, cotton, melons, cucumbers, grapes, figs, pomegranates, apples, peaches, mulberries, and walnuts. Among its forest trees are chestnut, beech, walnut, ash, maple, pine, fir, and oak. Horses, cows, oxen, buffaloes, sheep, and goats are common domestic animals. Erzerum, generally considered the chief city of Turkish Armenia, is the abode of a high pasha, who bears the title of seraskier. Van, Bayazid, Kars, Bitlis, and Mush, to which some add Diarbekir and Batum, are other important places in Turkish Armenia. Erivan, Nakhtchevan, Shusha, and Akhaltzikh are leading cities of Russian Armenia, which also contains Etchmiadzin, the abode of the catholicos or head of the Armenian church. Urumiah, Khoi, and even Tabriz, in Persia, have been reckoned as cities of Armenia.—The Armenians proper, who however form but a small portion of the inhabitants of Armenia, call themselves *Haiks*, from a traditional ancestor Haig or Haicus, whom they represent as the son of Togarmah, who was a great-grandson of Noah through the line of Japheth and Gomer (Gen. x.). Haig, they say, was one of the prefects or directors in building the tower of Babel, but, refusing to pay divine homage to the image of Belus, who reigned in Babylonia, went northward with his family and others into the region of Ararat. Belus or Bel pursued them, and was slain in battle by Haig, who then went on to found cities, introduce wise laws and regulations, and promote the prosperity of his people, till his death, at the age of nearly 400 years. His eldest son, Armenag, succeeded him as king, and was himself succeeded by his son Aramais, who gave name to Armavir, a large and beautiful city, built of hewn stone, and situated probably at a place called Kasagh, near the Araxes. Armavir was the capital of the kingdom for about 1,800 years, while the Haig dynasty, including 59 kings, were on the throne. Aram, the seventh of this dynasty, and contemporary with the patriarchs Isaac and Jacob, is said to have defeated the Babylonian and Median invaders, conquered a large part of Asia Minor, and built the old city of Mazaca, afterward called Cæsarea and Kaisariyeh, in Cappadocia; and according to some traditions it was he (according to others Armenag) who left his name to Armenia. His son Arah, renowned for his beauty, was sought in marriage by Semiramis, and lost his life in the disastrous battle which followed his refusal. Semiramis grieved much over his death, placed on his throne his young son Gartos, also called Arah, and founded a magnificent city, long known among the Armenians as Shamiramagerd (city of Semiramis), now Van, which she made her royal summer residence. The Armenians were now for some time tributary to the Assyrians; but their ruler Parsuis is said to have joined the Median prince Arbaces and the Babylonian Belesis in destroying the empire of Sardanapalus, and to have afterward, as king of Armenia, hospitably received Sennacherib's sons Adrammelech and Sharezer, whose posterity subsequently established the kingdom of Vashburagan. Haikak II., king of Armenia 607–569 B. C., joined Nebuchadnezzar in his expedition against the Jews, and brought into Armenia a Jewish noble named Shambat with his family. From this Shambat descended the Armenian royal family of the Bagratides or Bagradites, some of whom, under the name Bagration, still hold high offices in Russia. The Armenians celebrate Tigranes I. or Dikran as their most powerful and excellent king, who put the Greeks under tribute; aided Cyrus the Persian in conquering the Medes, Lydians, and Babylonians; built Tigranocerta; reigned 45 years, and died five years after Cyrus. His son and successor Vahakn gained by his great courage and strength the title of Hercules the second, and was worshipped as a god. Van, king 371–351 B. C., enlarged and embellished the city of Semiramis and called it by his own name. Alexander the Great having defeated Vahey and brought the Haig dynasty to an end, the Armenians were for 164 years (323–159) ruled by governors really or nominally subject to the Macedonians or Syrian Greeks. The Romans make Artaces or Artaxias, one of these governors, and an Armenian, the founder of an independent kingdom and of the dynasty of the Arsacidæ, as well as of the city and capital Artaxata, on the Araxes, about 189 B. C. The Armenians make the founder of this dynasty to be Vagharshag or Valarsaces, brother of the Parthian king Arshag or Arsaces the Great, who gave Nisibis to Valarsaces for his capital about 149. According to the Romans, also, Zadriates, another prefect or governor, became king of Armenia Minor about 189; but his kingdom lasted only a short time. Great obscurity rests on the history of Armenia under the Arsacidæ. Tigranes II., sometimes called Tigranes the Great, and also Tigranes I., was, according to the Armenians, a great conqueror, and brother-in-law of the Georgian chief Mithridates, whom he appointed king of Pontus. This Tigranes is said to have made Nisibis his capital, rebuilt the old Tigranocerta, and founded another city of the same name on the Nymphius, a branch of the Tigris. His son and successor Ardavast was treacherously seized by Mark Antony, carried in chains to Egypt, and put to death in 34 B. C. Alexander, son of Antony and Cleopatra, ruled in Armenia a little while; but, after various changes, we find Abgar or Abgarus, grandson of Tigranes the Great, on the throne of Armenia at Edessa. The Armenians universally believe that this Abgar wrote the famous letter to Jesus which is quoted as genuine by Eusebius and others. In his reign all parts of Armenia became tributary to the Romans. About A. D. 78 Erovant transferred the capital to Armavir, and then built a new capital, Erovantashad, a little W. of Armavir. The Armenians speak of another Artaces, who ruled A. D. 88-129, built bridges, roads, and ships, encouraged literature, science, commerce, and every branch of industry, and died universally lamented; but Armenia afterward suffered much from struggles with and between the Romans and Parthians, and from persecutions, especially after the Parthian dynasty of the Arsacidæ gave place to the Sassanidæ, 226. The Armenian Arsacidæ continued to reign till 428. Then for about 200 years Armenia was subject to the Sassanidæ of Persia. In 637 the Arabian caliphs first invaded Armenia, and 10 years afterward imposed the capitation tax upon the nation. The rivalries between the courts of Damascus and Constantinople were long a source of great suffering in Armenia; but in 859 the Mohammedan court set up a tributary dynasty in that country, the Bagratides, of Jewish origin, as already noticed, who reigned there till 1079. Their capital was Ani, on the Akhurian, a few miles S. E. of Kars. A branch of the Bagratides reigned at Kars from 961. There was also a third Armenian kingdom about this time, that of Vashburagan, with Van for its capital. These little kingdoms, though inferior to the Byzantine empire in population, are said to have surpassed it commercially, industrially, and financially. But after various changes and disasters there came in 1049 the bloody and complete destruction of Ardzen, near the modern Erzerum, by the Seljukian Turks under Toghrul, which was followed by the similar destruction of Ani under his successor. One by one the Armenian kings migrated with their people, and their kingdoms soon ceased to exist, though another, established in the Cilician Taurus in 1080 by Rupen, lasted till it was conquered by the Egyptian Mamelukes in 1375. The Armenian nationality was now extinguished; Armenia itself, devastated by Genghis Khan and about 1390 by Tamerlane, afterward received as conquerors first the Turcomans and then the Osmanli Turks, while the Kurds, the Persians, and the Russians have at different times taken possession of certain portions.—The Armenians are now widely scattered, yet they everywhere retain their own language, customs, and habits, with a special love of their country, are extensively engaged in commercial and industrial pursuits, and possess great influence, particularly in Russia and Turkey. Their present number is variously estimated at from 2½ to 10 or even 12 millions. Probably there are 2½ million Armenians in the Turkish empire alone.

ARMENIAN CHURCH. According to the Armenians, the early patriarchal religion existed in Armenia till about 1700 B. C.; then Assyrian influence brought in Sabaism, which about 725 B. C. became Magism; and this after Alexander's conquest was confusedly united with Grecian idolatry, to which were added Scythian superstitions and the worship of gods from India. They relate that King Abgar, afflicted with a disease resembling leprosy, besought Jesus by letter to come and cure him, and proffered him a refuge in Edessa from the Jews who sought to destroy him; that Jesus answered this letter with a written promise to send, after his departure, a disciple who should cure the king's malady and give life to him and his; that after the Saviour's ascension the disciple Thomas sent Thaddeus, one of the seventy, to Edessa; that Abgar, with many others, believed and was baptized; that Sanatrug, one of Abgar's successors, put to death Thaddeus, and also flayed alive and crucified St. Bartholomew; that Jude, Eustathius, and other preachers suffered martyrdom in Armenia; that about this time a large part of the nation was converted, but very soon persecutions produced a general relapse into idolatry till about A. D. 300; that then Gregory the Illuminator preached the gospel with wonderful success in Armenia, baptized as converts King Tiridates and thousands of his subjects, and was ordained first bishop of the Armenians by Leontius, bishop of Cæsarea, about 302; that Gregory and Tiridates everywhere established schools, in which the children, especially of the heathen priests, were taught the Christian religion with the Greek and Syriac languages; and that Christian churches took the places of heathen altars, and the kingdom received a new life. The Armenians profess to have been the first nation that unitedly embraced Christianity; but a long and bloody conflict with Persian Magism followed before the nation fully secured religious liberty, A. D. 485. The Armenians received without question the decrees of the councils of Nice (325) and Ephesus (431); but those of Chalcedon (451) were formally rejected by the Armenian bishops, though they also anathematized Eutyches, while they strenuously maintained the formula of one nature in Christ. The Armenian church has been therefore anathematized as heretical by both the Greek and Roman churches.—The Armenians agree with the Greeks in maintaining the procession of the Holy Ghost from the Father only, and in most other doctrines; but they make the sign of the cross with two fingers (in reference to the two natures made one in Christ's person), while the Greeks make this sign with three fingers (in reference to the Trinity). They baptize infants (or adults converted from Judaism or other religion), like the Greeks, by partially immersing them in the font and then thrice pouring water on their heads; but, unlike the Greeks, they admit to their communion Roman Catholics or Protestants who have been baptized by sprinkling. Like the Roman Catholics, they believe in transubstantiation, adore the host in the mass, and profess belief in seven sacraments; but their prayers of extreme unction are mingled with those of confirmation, which is performed by the priest at baptism, and they reject the Roman purgatory, though they pray for the dead. The people have the communion in both kinds, the broken bread or wafer (unleavened) being dipped in undiluted wine and laid on the tongue of the fasting communicant. They worship saints and their pictures as well as the cross; insist on the perpetual virginity of Mary; maintain baptismal regeneration and the spiritual efficacy of penances and sacraments; and regard confession to the priest and absolution as essential to salvation; but absolution is not purchased, nor are indulgences given. They have 165 fast days, when no animal food can be eaten; 14 great feast days, observed more strictly than the Lord's day; and more minor feasts than days of the year. Their church services are performed in the ancient Armenian language. They have nine grades or orders of clergy, viz.: the catholicos, bishop, priest, deacon, subdeacon, porter, reader, exorcist, and candle lighter. The monks live according to the rule of St. Basil. There are no regular lay monks among them. The principal Basilian convent is at Etchmiadzin. There are two grades among the priests: the vartabeds (doctors or teachers), who must remain unmarried, and are again subdivided into two classes; and the parish priests, who must be married before attaining the rank of subdeacon. The bishops are generally elected from the vartabeds, and only in rare instances, by special dispensation of the catholicos or patriarch, from the monks. The metropolitans or archbishops are distinguished from the bishops only by a higher rank and certain honorary rights, but not by superior jurisdiction. At the head of the entire hierarchy is the catholicos; he resides in the convent of Etchmiadzin, in the province of Erivan, which since 1828 has been under the rule of Russia. His authority as head of the entire church is recognized by all Armenians except the adherents of the patriarch of Aghtamar on Lake Van, who since the 12th century has claimed the title of catholicos, but is recognized only by two towns and 30 villages, and had in the second half of the 17th century eight or nine bishops under his jurisdiction. Besides the patriarch of Aghtamar, the Armenian church has patriarchs at Sis, Constantinople, and Jerusalem, all of whom acknowledge the higher ecclesiastical rank of the catholicos of Etchmiadzin. The patriarchate of Sis embraces the churches of Armenia Minor, Cappadocia, and Cilicia, under the jurisdiction of about 28 bishops. The patriarchate of Jerusalem embraces the pashalics of Damascus, Acra, and Tripolis, and the island of Cyprus, and has 14 suffragan bishops. The patriarch of Constantinople has been since 1461 the civil head of all the Armenians in Turkey, and under his direct ecclesiastical jurisdiction are all the dioceses of Turkey, except those belonging to the patriarchates of Sis and Jerusalem. According to the reorganization agreed upon by the provincial council of Constantinople in 1830, the patriarchate of Constantinople embraces 18 archiepiscopal dioceses, with 35 suffragan bishops. One of the archbishops resides in Egypt. The patriarch of Constantinople, who takes rank with the great pashas of the empire, is elected by the ecclesiastical heads and the notables of the Armenian community in Constantinople. The notables were till 1839 chiefly wealthy bankers; but since then high officials of the Turkish government have obtained the ascendancy. Though of an inferior rank to the catholicos, the patriarch of Constantinople is in all other respects entirely independent, and even the name of the catholicos is no longer mentioned in the liturgical books used in Constantinople. Under the direct jurisdiction of the catholicos are the Armenians of Russia and Persia. In the former country the Armenian churches are by a ukase of 1836 divided into six dioceses (archbishoprics), with eight suffragan bishoprics or vicariates. Persia has an archbishop at Ispahan, with a suffragan bishop at Calcutta in India; and an archbishop at Tabreez with two suffragan bishops. The catholicos is at present elected by his synod, all the members of which reside at Etchmiadzin, and the election must be confirmed by the Russian government. The entire population connected with the Armenian church is estimated at about 3,000,000.—The United Armenians, also called Armeno-Catholics, are those who acknowledge the supremacy of the pope of Rome. As early as 1318 Pope John XXII. appointed a Dominican monk to be their archbishop at Soldania in Persian Armenia (afterward at Nakhtchevan). At the council of Florence (1439) a nominal union between the Roman and Armenian churches was effected, but it was not ratified. For centuries, however, there have been Armenians in Persia, Poland, Transylvania, Turkey, &c., acknowledging the pope and agreeing doctrinally with the Roman Catholic church, but retaining their own usages, such as the communion in both kinds and the marriage of the priests. They have had a patriarch in Cilicia since 1742. The monks of St. Anthony, who have an abbot on Mount Lebanon, and the Mekhitarists, whose labors have been conspicuous in Armenian literature, are the principal monks among them. They are estimated to number 15,000 in Constantinople and 100,000 in the Turkish empire. According to the "Papal Almanac" for 1872, the Armeno-Catholic church has one patriarch (of Cilicia), five archbishoprics in Turkey and one (Lemberg) in Austria, eleven bishoprics in Turkey and one (Ispahan) in Persia. The papal bull *Reversurus*, dated July 12, 1867, which without consulting the Armenian bishops made important changes in the constitution of the Armeno-Catholic church and in its relations to Rome, called forth a violent opposition. At a national synod held in 1869 the majority of the bishops protested against the bull; and when the patriarch of Cilicia, Hassun, the head of the church, attempted to carry out the provisions of this bull, the bishops declared (Feb. 14, 1871) the election of Hassun, which had taken place in 1866, to have been illegal, and elected Archbishop Bahdiarian of Diarbekir as patriarch of Cilicia. The new patriarch, with all the bishops and priests who had taken part in the election, was excommunicated by the pope on Nov. 2, 1871. This fate was toward the close of 1872 shared by all the members of the church who refused to recognize the authority of the patriarch Hassun and the decrees of the Vatican council. The excommunicated portion of the church has put itself in communication with the Old Catholics of Germany.—The Protestant Armenians have arisen within the last 50 years. An Armenian priest, Debajy Oghlu, living at Constantinople, about 1760 wrote a book, which was circulated in manuscript, on the errors of the church, praising Luther, severely chastising both priests and people for their superstition and vice, and testing every principle and ceremony by the Bible. The British and Russian Bible societies published and circulated (1813–'23) thousands of Bibles and Testaments in the ancient Armenian language, with the approval of the catholicos of Etchmiadzin. They also published (1822–'3) the New Testament in Armeno-Turkish (Turkish in Armenian characters) and modern Armenian; but the Armenian patriarch and other clergy refused to sanction these translations. In 1830–'31 the Rev. Messrs. Eli Smith and H. G. O. Dwight, sent by the American board of commissioners for foreign missions, explored Armenia itself. The same board had had for several years a mission in Syria, where several Armenian ecclesiastics were converted. In 1831 the Rev. William Goodell, who went to Syria in 1823, established a mission of the board at Pera, a suburb of Constantinople, and was joined in 1832 by Mr. Dwight. These and other American missionaries who subsequently joined them directed their efforts especially to the enlightenment and reformation of the Armenian nation, and, though bitterly opposed by the patriarch and other Old Armenians whose coöperation they sought, gradually extended their operations and influence through the empire, giving religious instruction, translating the Scriptures, preparing and distributing religious and educational works, establishing schools, promoting religious liberty, &c. In 1843 Ovagim, a young Armenian who had in a fit of passion professed Mohammedanism and afterward returned to his former faith, was beheaded publicly at Constantinople by the Turkish authorities; but this led to the British minister's demanding and with the help of other foreign ministers obtaining from the sultan a written pledge that the death penalty should not be applied to such cases. But the opposition to the evangelical movement among the Armenians became still more violent. June 21, 1846, the Armenian patriarch finally excommunicated and anathematized all who remained firm to their evangelical principles, and decreed that the anathema should be annually read in all Armenian churches in the empire. July 1, 1846, the first evangelical Armenian church of Constantinople was formed, with 40 members, including females, and one week later Mr. Apisoghom Khatchaduryan was ordained its pastor. Similar churches were formed the same summer at Ismid (Nicomedia), Adabazar, and Trebizond. Nov. 15, 1847, the native Protestants were officially recognized as constituting a separate and independent community, and in November, 1850, the sultan gave to the native Protestants of Turkey a charter placing them on an equality with the older Christian organizations, and providing for a head or agent (a layman) nominated by their regular ballot, and appointed by the Porte, and also for national, provincial, and local councils chosen by themselves, to regulate their own affairs. The *Hatti-Humayun* or *Hatti-Sherif*, issued by the sultan in February, 1856, placed them on a legal equality with Moslems. In 1859 the appointment of a Protestant Armenian censor by the Turkish government relieved the Protestants from annoyances proceeding from the Old Armenian censor. The mission of the American board to the Armenians of Turkey has now grown into four distinct missions, to European, western, central, and eastern Turkey, the first having special reference to the Bulgarians, the other three to the Armenians. In the three Armenian missions there were reported, in January, 1872, 37 ordained and 63 unordained (mostly female) American missionaries, 16 stations and 184 out stations, 75 churches with about 3,800 church members, 19,411 registered Protestants, nearly 50 native pastors and as many licensed preachers, several theological and training schools and classes with over 180 pupils, 115 pupils in girls' boarding schools, and 5,657 pupils in 197 common schools.

ARMENIAN LANGUAGE AND LITERATURE. The ancient Armenian language, which is still the literary and church idiom of the Armenians, belongs to the Indo-European family, is enriched very considerably from the Sanskrit, abounds in gutturals, and has strength, flexibility, compass, and capability of expressing thought by evolving new terms from itself. The conversion of the nation to Christianity led to the introduction of certain words from the Greek, and impressed on the language a new character in several respects; the Persian and Turkish conquests produced other changes. The modern or spoken Armenian dialects differ very considerably from the ancient—the Ararat or eastern dialect less, however, than the Constantinopolitan or western dialect—chiefly in the disuse of certain words, the introduction of new words and phrases, and a change in grammatical forms, collocations of words, and idiomatic expressions. The alphabet consists of 38 letters, 36 of which were invented by the monk Mezrob about 409, and the other two added in the 12th century. In the form of the substantives generally no distinction is made to indicate gender; but besides the ordinary cases, nominative, genitive, dative, accusative, ablative, and instrumental, there are two others called the narrative and circumlocutory, formed by prefixes. The adjective, when not closely connected with the substantive, is similarly declined, and changes its form to denote the comparative degree; but the superlative is generally shown by writing the adjective twice, or by prefixing an adverb like the English *most*. The verbs, divided according to their vowels into three conjugations, and having a passive voice, vary their forms to denote the present and imperfect, have two future and two aorist tenses, of peculiar form, and the usual compound tenses formed with an auxiliary verb. The other parts of speech present no noteworthy peculiarities.—Ancient Armenian literature, older than the introduction of Christianity, is now limited to a few fragments of ancient songs preserved by Moses of Chorene. With Christianity there came into Armenia a taste for Greek literature. Previous to the invention of the Armenian alphabet the language had been written in Greek, Persian, or Semitic characters; but Mezrob now instituted schools in which the new alphabet was taught, and with Isaac the catholicos sent learned men to Edessa, Constantinople, and elsewhere, to translate foreign works into Armenian. The most important result of this was the Armenian translation of the Bible by Isaac and Mezrob, begun from the Syriac, but finally made from the Greek, usually assigned to A. D. 411, but apparently completed after the council of Ephesus (431). This translation, still in use, is of much critical and more religious value, and the oldest Armenian book extant. It was first printed at Amsterdam in 1666, under the care of Bishop Uscan, and has been often reprinted. In 1805 Zohrab and the Mekhitarists published at Venice an improved edition of this Bible from manuscript authorities, Zohrab's improved text of the New Testament having appeared there in 1789. The influence of Mezrob's Bible was so great that the Armenian language suddenly attained a high state of perfection and regularity, and the 5th century became the golden age of its literature. Moses of Chorene or Khoren—who studied Greek at Alexandria, and after returning to Armenia became an archbishop, and died about 488 at the reputed age of 120 years—is considered by the Armenians their first classical writer. His history or chronicle of Armenia from the time of Haig to the death of Mezrob and Isaac (printed in London in 1736, with a Latin translation) is his most famous work, and next to Mezrob's Bible the most ancient authentic Armenian book. He also wrote on rhetoric and geography, and perhaps translated into Armenian the *Chronicon* of Eusebius (Venice, 1818; Latin, Milan, 1818). Contemporary with Moses of Chorene were Elisha or Eghishe, an Armenian bishop, who wrote a history of the religious wars of Vartan (a prince to whom he was secretary) with the Persians (Neumann's English translation, London, 1830), David the philosopher, &c. Armenian historical literature throws much light on the history not only of Armenia, but of all the neighboring nations (Persians, Parthians, Tartars, Arabs, &c.), and deserves much more attention than it has received. The recent history of Armenia by the vartabed Michael Tchamtchean (3 vols. 4to, Venice, 1786; afterward abridged in Armenian, Armeno-Turkish, and English) is probably their most valuable historical work in the past 500 years. The catholicos Nerses Klayetsi, who died at an advanced age in 1173, was distinguished as a theologian, sacred orator, and poet. His nephew, Nerses Lampronetsi, was a homiletical and liturgical writer. The Mekhitarists of San Lazaro, near Venice, have done much since 1717 for Armenian literature, preparing and publishing editions of the Bible and of many other works, in addition to those named above; as a history of Armenian literature by their abbot Somal (1829), works on grammar, arithmetic, geography, &c., in ancient Armenian, a semi-monthly Armenian newspaper, translations of French, Italian, German, English, and American books, &c. There are other Armenian printing offices and newspapers at Constantinople and elsewhere. Peshtimaljean prepared about half a century ago a good grammar and dictionary of the ancient Armenian language. Another learned Armenian composed a Persian dictionary (in Persian, Armenian, and Turkish), which was published at Constantinople about the same time. But before the mission of the American board was commenced (1831), comparatively little was done for the languages actually spoken or read by the Armenians. Even Peshtimaljean's school had only a spelling book and one or two other first books in the modern Armenian. But in 1861 the missionaries had translated the whole Bible into both the Armeno-Turkish and modern Armenian languages, and had published many religious, educational, and other works. Much literary progress has since been made among all the Armenians. At the close of 1871 13 newspapers—3 of them dailies, 3 tri-weeklies, and 7 weeklies (one of which issues a daily bulletin)—were published in Constantinople for Armenians.

ARMIN, Robert, an English player, author, and associate of Shakespeare. His name appears in the original list of the performers of Shakespeare's plays, given in the first folio edition of his works. He translated a small Italian novel, "The Italian Taylor and his Boy," and wrote a dramatic piece entitled "The History of the Two Maids of More Clacke;" and he is alluded to by Nash in 1592 as a writer of stories and ballads. His only work which at present has interest is entitled "A Nest of Ninnies, simply of themselves, without Compounds. *Stultorum plena sunt omnia.* By Robert Armin, 1608." Only a single copy of the original edition remains, which is in the Bodleian library. It was reprinted by the Shakespeare society in 1842.

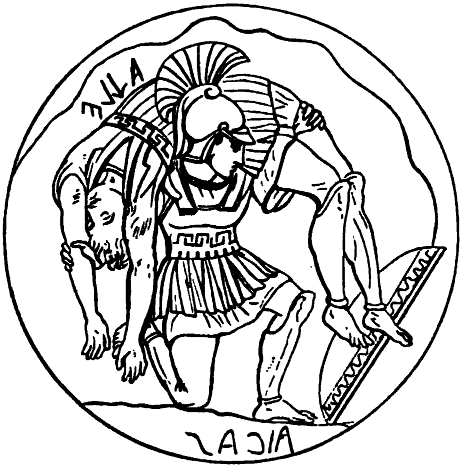
ARMINIANS, a religious sect deriving their name from James Arminius (see ARMINIUS), before whose death (1609) the Reformed in Holland were divided into Arminians and Gomarists, the doctrine of predestination being the prominent point raised between them. The Gomarists were supralapsarians, and demanded strict Calvinism in doctrine and the independence of the church in regard to the state; the Arminians held that the decree to save regarded the elect as believers, but they advocated Biblical simplicity in doctrine, a peaceful spirit in the church, and a subjection of the church to the state. After the death of Arminius, Jan Uytenbogaert, preacher at the Hague, and Simon Episcopius, Gomar's successor as professor at Leyden in 1612, became the Arminian leaders. But the strife now assumed a political aspect. Jan van Olden Barneveldt and Hugo Grotius, who favored the Arminians, influenced the states general to declare a 12 years' truce with Spain (1609), in opposition to the wishes of Prince Maurice of Orange, who was stadtholder, and were thereupon charged with being traitors and in the pay of Spain; while they, in turn, regarded Maurice as seeking supreme dominion with the subversion of liberty. The Arminians in 1610 set forth their doctrinal views in a remonstrance addressed to the states of Holland and West Friesland, and were hence called Remonstrants; and their opponents, who presented a counter-remonstrance, were called Contra-Remonstrants. The states general made fruitless attempts at conciliation by recommendations of mutual forbearance, and by the conferences at the Hague (1611) between six Remonstrant pastors and six Contra-Remonstrants, and at Delft (1613), where three appeared on each side; but finally, urged on by Maurice and the Contra-Remonstrants, who were now in the majority, they convoked a national synod at Dort in 1618, before which Episcopius and other Remonstrants were summoned. The Arminian views presented in the remonstrance, and afterward at Dort, were comprehended in these five points: 1. God, by an eternal and immutable decree in Jesus Christ his Son, before the foundation of the world, determined to save in Christ, for Christ's sake, and through Christ, those out of the fallen human race who by the Holy Spirit's grace believe in this same Son of his; but, on the other hand, to leave those who are not converted in sin and subject to wrath, and to condemn them. 2. Therefore Jesus Christ died for each and all, yet with this condition, that no one may in fact enjoy that remission of sins except the faithful man. 3. Man indeed has not from himself saving faith, but must necessarily be born again and renewed in Christ by his Holy Spirit, that he may be able to understand, think, wish, or perform anything good. 4. This grace of God is the beginning, increase, and perfection of everything good; so indeed that all good works which we can think out are to be ascribed to the grace of God in Christ, which is not irresistible in the mode of its operation; for it is said of many that they resisted. 5. Those who are engrafted into Jesus Christ by true faith, and are therefore partakers of his life-giving Spirit, have abundantly of the means by which to fight against Satan and their own flesh and obtain the victory, but yet through the aid of the Holy Spirit's grace; but Jesus Christ by his Spirit stands by them in all temptations, reaches out his hand, and, provided they are ready for the contest and seek his aid, and fail not of their own duty, confirms them; but whether they themselves cannot by their own negligence desert the beginning of their being in Christ, make shipwreck of conscience, and fall from grace, must be deeply pondered out of the Holy Scripture before they could teach it with full tranquillity of mind and full assurance. This fifth point was afterward modified, and the Arminians maintained explicitly the possibility of falling from grace. Before the synod of Dort was convened, the republican leaders, Barneveldt, Grotius, and Hogerbeets, were imprisoned; and the first of these was subsequently beheaded. The synod began its sessions Nov. 13, 1618, and closed them May 29, 1619. Disputes early arose as to the mode in which the Remonstrants should defend themselves; criminations were answered with recriminations; the Remonstrants were ejected from the synod (Jan. 14, 1619), condemned as corruptors of the true religion, and suspended from office till they should make satisfaction; and the Calvinistic doctrine of predestination was formally confirmed, but in such language as to be accepted by infralapsarians. The states general soon confirmed the decree of the synod. The Remonstrants were deprived of their sacred and civil offices; their preachers were banished if they did not renounce all exercise of their ecclesiastical functions; many went with Episcopius to Antwerp, others to Holstein, others to France, &c. After Prince Maurice's death (1625) their banished clergy began to return. Amsterdam and Rotterdam became their chief seats in Holland; the former city allowed them to build a church in 1630, and since that time they have not been molested. Episcopius published at Antwerp in 1622 the Remonstrants' Confession of Faith, which was widely circulated and held in high repute; but he expressly guarded against its being taken as of binding authority. He became in 1634 the first professor of theology in their gymnasium at Amsterdam, where Curcellæus, Pöllenburg, Limborch, Le Clerc, Cattenburgh, Wetstein, &c., have also been professors. These and others set aside human confessions and took the Bible alone as their guide, ascribing special importance to its practical directions. They denied the ordinary doctrine of original sin, modified the doctrine of the Trinity, and some of them were regarded as closely allied with the Socinians.—Arminianism has been widely prevalent in the established church of England from the time of Laud to the present; but under this common name have been ranged many shades of doctrine, Trinitarian, Pelagian, Socinian, &c., agreeing in little except their opposition to Calvinism. After the rise of Methodism, Whitefield and others avowed themselves distinctively Calvinistic, while Wesley and his followers embraced the views of Arminius. The most complete work of Arminian theology in English, and the text book prescribed for Methodist Episcopal preachers in the United States, is the "Theological Institutes" of the Rev. Richard Watson. The Lutherans, Unitarians, General Baptists, and Free-will Baptists, many in the Protestant Episcopal church of the United States, and the Wesleyan Methodist churches, are all classed as Arminians, in the sense of being opposed to the Calvinistic doctrine of predestination.

ARMINIUS (in German improperly called Hermann), prince of the Cherusci, a German tribe, and the liberator of Germany, born about 16 B. C. In his youth he became a Roman citizen of the equestrian order, and served on the Danube as leader of an auxiliary body of the Cherusci. On his return, finding his country smarting under the oppressions of the Roman commander Varus, he organized an extensive conspiracy. Professing great friendship for Varus, and admiration for Roman civilization, he induced the general to distribute a large part of his force in small detachments among different tribes, under the plea of maintaining better order among the Germans. The news, true or false, of an insurrection having reached the Romans, Varus marched in October, A. D. 9, from the Weser toward the Teutoburg forest (now partly in the principality of Lippe and partly in Prussia). Arminius, against whom Varus had in vain been warned, now gave the signal for insurrection. The Romans scattered in the interior were murdered, and the main body, which was encumbered with vast trains of baggage and camp followers, found itself surrounded on all sides. The Romans fought their way for three days, until almost all were exterminated, Varus taking his own life. From among the prisoners, the chiefs, civil and military, were sacrificed to the gods, the rest enslaved. This destruction of three Roman legions filled Rome with grief and shame. For several days Augustus would only utter the words, "Varus, give me back my legions!" More than four years elapsed before Germanicus marched from Gaul to avenge the fallen; he advanced into Germany, but returned, after a short campaign, the same year. Among the Germans dissensions soon prevailed. Arminius carried off Thusnelda (celebrated afterward in German minstrelsy), daughter of Segestes, a Germanic chief friendly to the Romans, and married her, but she soon fell again into the hands of her father. Next year (15) Germanicus entered with fresh troops, relieved Segestes, who was besieged by Arminius, and liberated him, but Thusnelda was made a Roman slave. Arminius now called the Cherusci and other tribes to arms. Germanicus led against him 80,000 men in three divisions, and a large fleet on the Weser and the Ems. Arminius retreated until he had drawn the Romans into narrow passes, and then attacked them with such fury that Germanicus, having lost his cavalry, was obliged to retreat, and reached his vessels with difficulty; four legions under Cæcina scarcely escaped total destruction previous to crossing the Rhine. The next spring Germanicus returned with an army of 100,000 men and about 1,000 vessels on the rivers. Beyond the Weser, between the present towns of Hameln and Rinteln, on a plain called Woman's Meadow, was fought the greatest battle between the Germans and Romans. The Germans were beaten, but nevertheless renewed the struggle the next day, and obliged the victorious Romans to retreat. This was the last time that Roman armies invaded Germany beyond the Rhine, and Arminius is therefore justly called the liberator. According to a legend, he disappeared in a mysterious manner during an interview on a half-built bridge with his brother Flavus, who remained attached to the Romans and tried to persuade Arminius to return to them. But history says that Arminius, being proclaimed chief by the Cherusci and numerous other tribes, attacked Marbod (Maroboduus), chief of the Marcomanni, his rival in pretensions to supreme power, who was supported by Inguiomer, the uncle of Arminius. After a terrible struggle in Saxony, and a great undecided battle, Marbod was abandoned by many of his partisans, returned to Bohemia, and finally fled to the Romans, leaving Arminius in undisputed possession. Arminius finally excited discontent by the strictness of his rule, and perished by the treachery of one of his relations. His wife Thusnelda, their son Thumelicus, born in captivity, and Segmund, brother of Thusnelda, appeared as prisoners in the triumphal cortége of Germanicus in Rome, A. D. 16. The lineage of the Cheruscan princes was extinct, with the exception of Italicus, son of Flavus, who in 47 was given up by the Romans to the Cherusci at their request. Tacitus says that the name of Arminius was alive in the songs of the "barbarians of his time," and it still lives in Germany. It was the theme of many patriotic songs during the rising in 1818 against the domination of Napoleon.

ARMINIUS, James (in Dutch, Jacob Harmzen or Hermanszoon), a Dutch theologian, born at Oudewater, South Holland, in 1560, died at Leyden, Oct. 19, 1609. In his infancy his father died, leaving him with his brother and sister to his mother's care. Theodore Æmilius, an ex-priest, undertook to educate him, but died when Arminius in his 15th year was studying at Utrecht. The boy found another patron in his countryman Rudolph Snellius, who took him to Marburg in Hesse; but he soon returned to the ruins of Oudewater, where the Spaniards had massacred his mother, brother, sister, and other relatives, with nearly all the inhabitants. Then he went back on foot to Marburg; but as the new university at Leyden was now opened, he returned to Holland the same year, and the Reformed pastor at Rotterdam, Peter Bertius, sent him with his own son to Leyden, where he remained six years. The magistrates of Amsterdam engaging (1582) to bear his expenses in studying for the ministry, he gave a written bond to devote himself after ordination to the ministry in their city, and to no other work or place without the burgomaster's sanction. He went at once to Geneva, where Beza was lecturing; soon gave offence there by advocating the system of Ramus in opposition to the reigning philosophy of Aristotle; went then to Basel, where he lectured publicly, and the theological faculty offered him a doctorate, which he declined on account of his youth; returned to Geneva in 1583, and continued his study of divinity; went in 1586 to Padua, and heard Zabarella's lectures in philosophy; visited Rome and some other places in Italy; and stopped again at Geneva, where Beza gave him a commendatory letter. Summoned to Amsterdam, he found himself, in the autumn of 1587, in disfavor with his patrons for having visited Italy without their consent, and, as was reported, kissed the pope's foot, become intimate with Bellarmine and the Jesuits, and abjured the reformed religion; but he exculpated himself, was licensed to preach by the Amsterdam classis, received a unanimous call, and was ordained pastor in Amsterdam, Aug. 11, 1588. Here he passed 15 years in a very popular and successful ministry. He married in 1590, and had seven sons and two daughters, only two of whom—Lawrence, a merchant, and Daniel, a distinguished physician—reached full maturity. Soon after his settlement in the ministry, Arminius was led toward the theological system which bears his name (see Arminians), through a controversy which arose at Delft in 1588 respecting Calvin's and Beza's views on predestination. He was urged and consented to undertake the defence of Beza, but suspended his purpose on account of difficulties respecting some of Beza's and Calvin's positions. He gave public expositions of Rom. vii. and ix. (1591–'3), presenting the views afterward published in his treatises on those chapters, and producing in each case considerable excitement. In 1597 he conferred with Francis Junius, professor of divinity at Leyden, and had a long and friendly epistolary discussion with him respecting predestination, which is published in the works of Arminius. He opposed in 1600 the annual subscription of the Dutch creed and catechism by all the ministers. During the plague of 1602 he assiduously cared for the sick and bereaved. Junius died of this plague about the end of 1602, and the curators of the university soon chose Arminius to be professor in his place; but only after repeated applications of the curators, aided by leading men in the states, would the authorities of Amsterdam permit him to leave, April 15, 1603. The charge of his being a Pelagian led to a conference at the Hague, May 6, 1603, with Francis Gomar, primary professor of theology at Leyden, who declared the charge unsupported. He was the first to receive (July 11, 1603) the degree of D. D. from the university of Leyden, and delivered on the occasion his oration on the priesthood of Christ. He introduced his course the same year with three finished orations on the object of theology, on its author and end, and on its certainty. A fifth oration, on reconciling religious dissensions among Christians, he delivered Feb. 8, 1606, on resigning the annual office of rector of the university. A conflict had already begun between the two colleague professors, Arminius and Gomar. Arminius publicly maintained, Feb. 7, 1604, that "predestination, as it regards the thing itself, is the decree of the good pleasure of God in Christ, by which he resolved within himself from all eternity to justify, adopt, and endow with everlasting life, to the praise of his own glorious grace, believers on whom he had decreed to bestow faith;" and defined "reprobation to be a decree of the wrath or severe will of God, by which he resolved from all eternity to condemn to eternal death unbelievers, who, by their own fault and the just judgment of God, would not believe, for the declaration of his wrath and power." At the end of October Gomar, who was a supralapsarian, publicly attacked these positions, and was sustained by the principal teachers in the universities. Arminius replied. Not only the students and ministers, but the whole republic, now became involved in a religious war. Another trouble arose in respect to the word αὐτόθεος as applied to the Son of God, Arminius admitting its applicability in the sense of "one who is truly God," but not in the sense, which some maintained, of "one who is God of himself." Arminius was also charged with favoring the brief catechism published by the ministers of Gouda in 1607, which, it was alleged, would open the floodgates to all sorts of error. Arminius and his friend Jan Uytenbogaert, preacher at the Hague, called upon the states general in 1608 to convene a general synod, before which Arminius might defend himself. After a conference between Arminius and Gomar before the supreme court the same year, the states general, advised by this tribunal, enjoined the parties to drop their dispute, and teach nothing against the creed or catechism. But the disputes went on. Oct. 30, 1608, Arminius made before the states at the Hague his famous declaration (*Declaratio*) of sentiments on 10 different points, viz.: predestination, the providence of God, the free will of men, the grace of God, the perseverance of the saints, the assurance of salvation, the perfection of believers in this life, the divinity of the Son of God, the justification of man before God, and the revision of the Dutch confession and the Heidelberg catechism. The states general as a body were now inclined to favor Arminius. Another conference in 1609 between Arminius and Gomar, aided by four other ministers on each side, was soon interrupted by the sickness of Arminius, who, exhausted in body and mind, and deeply wounded by evil reports, sank under a complication of fever and other diseases. He was an energetic and eloquent preacher, and personally attractive. Mosheim styles him "a man whom even his enemies commend for his ingenuity, acuteness, and piety." Many have been called Arminians whose views differed widely from his, and many have been called Calvinists whose views agreed mainly with his. His works have been published in Latin (*Jacobi Arminii Opera Theologica*, 4to, Leyden, 1629), and translated into English by Nichols and Bagnall (3 vols. 8vo, Auburn, 1853).

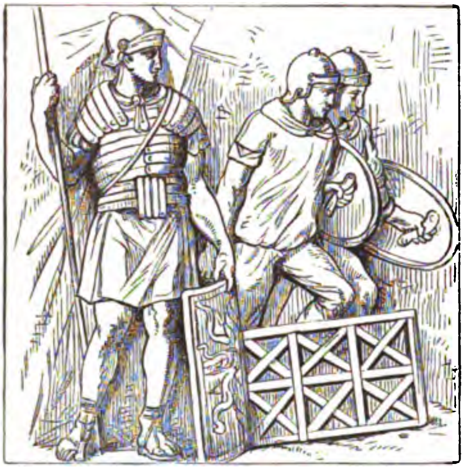
ARMITAGE, Edward, an English painter, born in London in 1817. He was a pupil of Paul Delaroche, whom he assisted in the decoration of the "Hemicycle" in the school of fine arts at Paris. He first brought himself into notice in England as a competitor for prizes at the several exhibitions of cartoons and specimens of fresco painting at Westminster hall, London, in 1843-'5; and he subsequently executed several frescoes in the new houses of parliament. He has produced many large and elaborate historical works, and is one of the most prolific painters of the modern English school. His range of subjects embraces sacred and profane history, allegory, and battle scenes. Some of his Scriptural pieces are conceived with originality, but he is deficient as a colorist.

ARMOR, a defensive covering for the head, body, and limbs, used as a protection in battle. Armor of some kind seems to have been used by almost every civilized and savage people, from the earliest historic times till the gradual improvement in firearms rendered it useless as a means of defence wherever these were employed. Even of late years body armor has been worn by cuirassiers in the armies of several nations of continental Europe, but it has proved worthless as a protection against bullets from the present perfected small arms.—In the most ancient times defensive armor was undoubtedly made of skins; but history gives little account of this, and the oldest complete and authentic records we possess speak of metal armor. From the earliest times of the Old Testament (a complete panoply being described in 1 Sam. xvii.) to the fall of the Roman empire, bronze or brass seems to have been the material used for helmets and body armor by all the principal nations of antiquity, while their shields and bucklers were sometimes made of wood covered with leather or studded with brass, of bull's hide or of wickerwork covered with hide, as well as of solid bronze like their armor and weapons; for the ancients were long ignorant of the art of tempering steel, though they tempered bronze to a wonderful hardness. Even when the Romans, at an early date, introduced steel for weapons, their defensive armor remained of bronze; and the same was the case with that of other nations.—The armor of the Hellenic chiefs, as described by Homer, and, with slight modifications, that of the Greek warriors during all the period of their country's greatness, consisted of a crested helmet which could be drawn down so as to partly cover the face; a small breastplate, worn so low as to leave the whole clavicular region bare; a plated waistband, from which hung a short kilt or petticoat of cloth or leather covered with narrow metallic plates; and greaves or

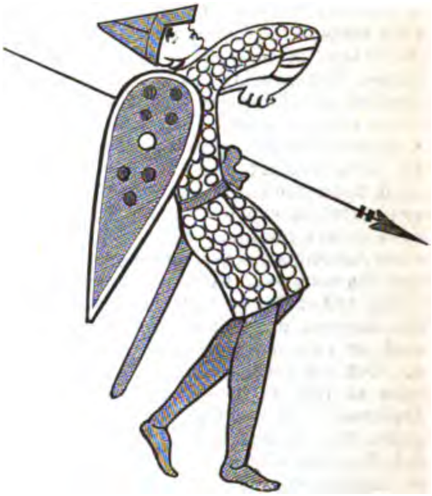


Greek Armor. (From the Ornaments of an Etruscan Mirror.)

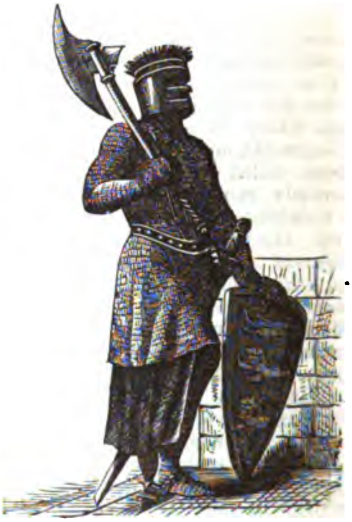
sheaths of solid metal for the legs from knee to ankle; the greaves were moulded to the form of the legs, and sometimes covered the knee. The Greeks carried at first large circular shields, covering almost the whole man; afterward smaller ones of the same shape.—The Roman soldiery wore armor almost exactly like that just described, save that they carried oblong instead of round shields. After a time, too, they rejected the greaves, and fought with the legs bare. So few changes were made in the armor itself, however, that even in the time of the crusades the soldiers of the eastern empire still wore exactly such equipments as are pictured in the bass-reliefs of Trajan's column.—The oriental nations adopted at an early period an armor made of overlapping scales of metal sewn upon leather, and fitting the whole body of the wearer. They also clothed their horses in this armor. The Sarmatians especially are said to have worn this armor, if indeed they did not introduce it.—Such were the principal kinds of armor in use among the leading nations of eastern Europe and of the Orient; but it was in western Europe that the complete defensive armor afterward used, which reached its perfection in the middle ages, had its origin. A manuscript of the reign of Charles the Bald (A. D. 860) shows the armor of the western nations which had once been Roman provinces, or had come in contact with Romans, to have been similar to the Roman dress just described. But soon afterward great changes began. We have little to show the manner of these changes, but we find their result, two centuries later, shown in the Bayeux tapestry, executed some time after the invasion of England by William the Conqueror (1066). This shows the Saxons to have adopted an armor consisting of a long tunic reaching to the knee, and made of leather upon which were sewed stout metal rings, close together. They wore conical steel caps. The Normans wore similar tunics or shirts, divided so that they fell on each side the horse of a mounted knight; but they made their armor of actual mail, formed of rings woven together like those in a modern curb chain; they wore long sleeves, which the Saxons had not, and long hose woven of rings. The Norman shield was in shape like a modern smoothing-iron. The fact that this flexible mail might be driven into the flesh by a hard blow, in spite of the heaviest lining, led to the introduction of plate armor. First the square-topped helmet of the templars was adopted, covering the whole face, and having a door opening laterally on hinges. Then poldrons, or plates covering the shoulders, *genouillères*, or



Roman Armor. (From Trajan's Column.)

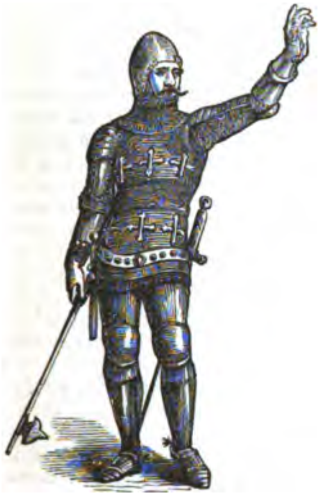


Norman Spearman. (From the Bayeux Tapestry.)

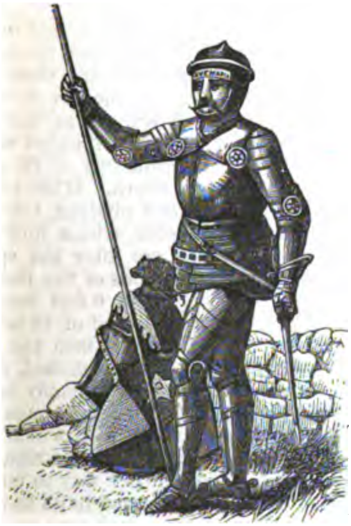


Full Suit of Chain Mail, Time of the Early Crusades.

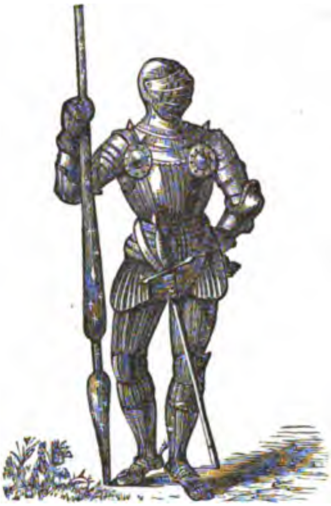
knee-pieces, of jointed steel splints, and plate shoes, were added to the mail; and this was the suit of armor, of the best and most approved construction, so late as to the time of the third crusade of Richard Cœur de Lion and Philip Augustus, in 1189, both of which monarchs are represented in their great seals equipped and armed exactly as described. Without detailing the gradual but constant encroachment of plate armor upon mail, it is enough to say that it lasted for 200 years, adding piece by piece, until in the beginning of the 15th century we find complete suits of plate, casing the wearer in steel from head to foot. From that time this armor was gradually improved, until it reached its perfection during the reign of Henry VII. In the suit of that time we find perhaps the greatest security and beauty ever combined in armor. The whole suit is fluted; the neck is defended by pass guards, rising perpendicularly from the shoulders; the helmet assumes a natural form; the back of the neck is protected by flexible plates; and the whole of the headpiece is made to adapt itself to every movement. The horse's head is guarded by the *chamfront*,



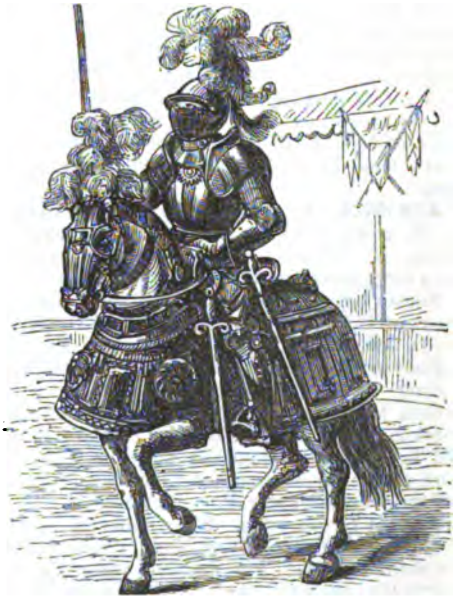
Armor comprising both Mail and Plate, A. D. 1870.



Early Armor of Plate, A. D. 1416.



Fluted and Perfected Plate Armor of Henry VII., 1485-1509.



Armor of Man and Horse, A. D. 1584.

to which are added the *manifaire*, protecting the crest and arch of the neck, the *poitrel* of solid plates covering the counter, and the *croupier*, also of solid steel, extending over the whole rump of the animal from the castle of the saddle to the tail. These parts of the horse armor constitute what is called the barding proper. It was in this reign that the art of defence had so far surpassed the means of offence, that it is on record that in Italy, where the best armor, that of Milan, was made, two armies fought from 9 o'clock in the morning till 4 in the afternoon, in which battle not only no person was killed, but no one was wounded. From this date, however, the use of armor has constantly declined, and with the description given above its real history may be said to end; for piece by piece was gradually laid aside as firearms were used and improved more and more, and hand-to-hand conflicts were avoided. At the beginning of the present century the only troops who still wore defensive armor were the heavy cavalry of the Austrian, Russian, and French imperial armies, who were all cuirassiers. Napoleon I. made great use of this arm, but at Waterloo the iron-sheathed cuirassiers went down like grass before the English household troops, who wore no armor; and in the last battles of the Crimea, although there were cuirassiers in the armies of all the three belligerents, no use was made of them in the field. In the early part of our late civil war an attempt was made to introduce bullet-proof waistcoats of steel among the national troops, but they were soon laid aside.—For a detailed history of armor, see especially "A Critical Inquiry into Ancient Armour," &c., by Dr. (Sir Samuel) Meyrick (2d ed., London, 1844); also an excellent essay and catalogue in the *Catalogue des collections composant le musée d'artillerie*, by O. Penguilly l'Haridon (Paris, 1862).

ARMORICA, the name anciently given to the N. W. coast of Gaul, from the Loire to the Seine. It had a considerable fleet and carried on a large intercourse with Britain. Maximus, a Roman officer, having revolted with the legions of Britain against the emperor Gratian, A. D. 383, passed into Gaul with two Roman legions and a number of aboriginal Britons, among whom was one Conan Mariadec, to whom Maximus gave the government of Armorica. Mariadec obtained the recognition of his independence from the emperor Theodosius, and in the 5th century thousands of British Celts came over, rather than remain under the hated Saxon yoke. They found in Armorica a hospitable reception, and a dynasty akin to them in race. The descendants of Conan Mariadec successfully repelled the Danish, Norwegian, and Irish pirates from the coasts of Armorica, and also, on the land side, the various German tribes who invaded and ravaged Gaul. During the 5th and 6th centuries it was the most peaceful and prosperous part of that country. The Christian religion was early propagated there. Bishops of Dol, Quimper, and Vannes are recorded at the end of the 4th century, and the annals of Armorica preserve a long roll of Celtic saints whose names are not known elsewhere. From the influx of Britons Armorica about the 6th century began to be called Brittany (Bretagne).

ARMS, instruments or weapons of offence, as opposed to defensive armor. Arms may in this sense be separated into two broad divisions of ancient and modern, reckoning the latter from the adaptation of gunpowder to purposes of war; and each of these may be again distinguished into missiles and weapons for hand-to-hand encounter. It is evident that offensive arms were prior in their invention and use to defensive coverings. In the earliest wars recorded in history, missiles were the principal weapons used. The bow (see ARCHERY) and the javelin were in the period chronicled in the Old Testament the favorite weapons of the Assyrians, Medes, Persians, Parthians, and other oriental races; while their instruments for close fight were merely weak, straight daggers, *acinaces*, which word has been falsely translated scymitars. In the heroic wars, as described by Homer, missiles were still, in the hands of the leading chiefs and heroes, the most important weapons; a ponderous spear, hurled from the hand, and rarely if ever used to thrust with as a pike, being the instrument which began nearly all the duels of the champions, although they were often ended by the short sword. The masses, indeed, seem to have fought in phalanx or close column with the pike, or *sarissa*, afterward the arm of the free Greeks of the republican cities, and of the barbaric kingdoms of Macedonia and upper Hellas. This was 24 feet long, and the spearmen held it in both hands, having their persons obliquely covered by the great round shield worn upon the left arm. The tactic on which the success of this arm depended was a closely serried phalanx, ordinarily of 12 or 24, occasionally of 50 files in depth. If the enemy succeeded in breaking this phalanx, the men had recourse to their swords, which, however, seldom proved of much use after the spears had given way.—The weapons of the Romans were a short, massive javelin, 6 feet long, including the triangular steel head of 18 inches, which they were wont to hurl into the lines of their enemy at 10 or 15 paces distant, and a short two-edged broadsword, probably in the first instance of Spanish origin and manufacture. This latter instrument, with which they were trained to stab rather than to strike, was that with which Rome cut her way to universal empire. Her tactic, adapted to its use, was a loose array of open lines, each man standing three feet from his left and right hand comrades, so that he had a clear space of six feet in which to manage his sword and buckler, and fighting as it were a duel or single combat, hand to hand, with his immediate opponent, over whom his peculiar weapon, his singular skill in its use, and his incessant drilling in athletic exercises of all sorts, gave him immense advantage. With the Greeks and Romans infantry was the front and principal feature of their armies. In cavalry they were weak, and in the period of their greatest empire archery and slingers were contemptuously disregarded.—But with the decline of the Roman empires, especially that of the East, a new arm of the service took the lead in the steel-clad cavalry of the middle ages. Infantry, with but two exceptions, the English and the Swiss, were almost powerless against it. The arms of these feudal troops were the lance, the mace, the battle-axe, and the two-handed sword; but it is to the first that they owed their success. This was a ponderous weapon of 18 feet in length, balanced by the great weight of its butt end, which was often nearly a foot in diameter at 20 inches from the extremity, having a notch cut out to admit the upper arm of the champion, which steadied it as it was laid in rest, supported by a projecting iron catch attached to the right-hand side of the knight's corslet. With this weapon, protruding 10 feet beyond their horse's chest, sheathed in panoply which defied any missiles which in that day could be brought against it, with the sole exception of the English clothyard arrow, infantry could seldom resist their shock. The arms of the infantry of this time were, besides the famous bows of the Englishmen, the bills—something similar to a short heavy scythe blade set erect on a shaft four feet long—leaden mallets, and long knives of the Anglo-Norman archers; the pikes and halberts of the Swiss, which won them the day of Sempach, and did them good service at Morat, Granson, and Nancy, when the Austrian and Burgundian chivalry had dismounted; the crossbows of the Genoese; and the spears of the Scottish foot, who fought like the Greeks in phalanx.—Such were the distribution and relative importance of different arms during the greater part of the middle ages, and until the battle of Pavia, in 1525. This date marks the division between ancient and modern arms; for although gunpowder had been long before invented, it was at Pavia that the matchlock was first used in such a form as to make it of any practical value. Even then it was a most imperfect and awkward weapon, fired from a rest. From this time firearms were improved, and the ancient offensive weapons, though they held their own for a considerable period, passed slowly out of use. The range of firearms was still very limited, and the accuracy of aim imperfect; and, till the musket was combined with the bayonet, the musketeer had no means of defending himself either against charging horse, or against infantry with long weapons, at close quarters, and he was therefore of necessity protected by pikemen. But at the beginning of the 17th century the bayonet was added to the arquebuse or musket, which had become from a matchlock a firelock, and now united in itself the properties of both pike and gun, and could be used indiscriminately as a missile or a weapon at close quarters. From this time, so rapid was the progress made in firearms, and so general their adoption, that the bullet soon became the arbiter of every battle, the combatants seldom coming to sufficiently close quarters to permit the use of weapons of the old form. The American war of independence and the French wars of the revolution brought the rifle, which was by no means a new weapon—for the principle of rifling or screwing barrels, as it was then called, and its effect on the bullet, were known and used even in matchlocks as early as the 16th century—into general notice, and the invention of percussion doubled even its utility. From this time began that wonderful series of improvements in rifled small arms and cannon which has made the military rifle of to-day a most formidable weapon. The invention of the simple modern percussion lock, of the Minié rifle bullet, of revolving pistols, and especially of breech-loading firearms of every kind, has enormously increased the means of offensive warfare. (See ARTILLERY, CANNON, GUN, GUNNERY, GUNPOWDER, MUSKET, PISTOL, RIFLE.)

ARMSTRONG, a W. county of Pennsylvania, intersected and partly bounded by Alleghany river; area, 750 sq. m.; pop. in 1870, 43,382. The surface is undulating and the soil generally fertile. The Pennsylvania canal passes through its southern extremity. Its most valuable mineral productions are iron, salt, and coal. In 1870 the county produced 298,194 bushels of wheat, 135,257 of rye, 680,314 of Indian corn, 883,846 of oats, 33,192 tons of hay, 126,068 lbs. of wool, and 964,020 of butter. Capital, Kittanning.

ARMSTRONG, John, an American officer in the revolutionary war, born at Carlisle, Pa., in 1758, died at Red Hook, Dutchess county, N. Y., April 1, 1843. At the age of 18 he entered the army as a volunteer, and at the battle of Princeton was one of Gen. Mercer's aids, and bore him in his arms from the field when he had received his death wound. He afterward became a favorite of Gen. Gates, and served under him, with the rank of major, through the remainder of the war. During the winter of 1782-'3, while the army was encamped at Newburgh, great anxiety was felt as to the arrearages of pay, and the half pay promised to those officers who should serve through the war. After an unsuccessful application to congress, a meeting of officers was called anonymously for the 11th of March, 1783, to discuss their grievances. An anonymous address was issued, in which the writer exhorted his comrades to refuse to perform further military duty during the war, or to lay down their arms on the return of peace, unless their just demands were complied with. Washington immediately issued a call for a similar meeting on the 15th, for the discussion of their claims, which was followed by another anonymous address, construing the action of Washington into an approval of the course previously proposed by the writer. At this meeting Washington addressed the officers with great feeling, assuring them of his ardent desire to coöperate with them in obtaining the ends which they had in view, but begging them not to follow the dangerous advice of the writer of the addresses. His eloquence was successful, and he afterward obtained from congress what the soldiers required. Armstrong wrote these anonymous productions at the request of many of his fellow officers, and although Washington had greatly blamed their author at the time, he afterward changed his opinion. Gen. Armstrong was subsequently secretary of state of Pennsylvania, and a member of the old congress. In November, 1800, he was chosen U. S. senator from New York, and in 1804 was sent as minister to France, where he served with ability, at the same time acting as minister to Spain. He returned home in 1810. At the commencement of the war of 1812 he received a brigadier general's commission, and the command of the district which included the city of New York. In the following year he was appointed secretary of war, and removed the war department to Sackett's Harbor. He incurred much blame for the capture of Washington in 1814, but very unjustly, as Gen. Winder, to whom the defence of the district had been intrusted, was appointed by the president in direct opposition to his advice. Gen. Armstrong's indignation at Mr. Madison for taking no steps to relieve him of this undeserved disgrace ended in his resignation. He wrote two treatises on farming and gardening, a criticism of Gen. Wilkinson's memoirs, biographical sketches, and a history of the war of 1812. He also partly prepared a history of the American revolution.

ARMSTRONG, John, a British physician, poet, and miscellaneous writer, born in Castleton parish, Roxburghshire, about 1709, died in 1779. His father was a clergyman. He studied at the university of Edinburgh, and after receiving his medical diploma settled in London, where he published anonymously "An Essay for Abridging the Study of Physic" (1735), ridiculing the ignorance of the apothecaries. In 1737 he published an outrageously indecent poem entitled "The Economy of Love." In 1744 appeared "The Art of Preserving Health," a didactic poem whose merits were greatly overrated. In 1760, through the influence, as it is said, of John Wilkes, he was made physician to the army in Germany, and held that office until the peace of 1763. He also published a volume of "Sketches or Essays," a collection of short poems under the title of "Miscellanies," a "Short Ramble through France and Italy," and a volume of medical essays.

ARMSTRONG, John. See supplement.

ARMSTRONG, John, an English physician and author, born at Bishop-Wearmouth, May 8, 1784, died in London, Dec. 12, 1829. He graduated at Edinburgh university, and practised at Sunderland, where he wrote a work on "Typhus" (1816), which had a rapid sale throughout the kingdom. In 1818 he removed to London, where he failed to pass his examination before the college of physicians; but as that institution was exceedingly unpopular in the profession, his rejection was ascribed to jealousy, and he was soon afterward elected physician to the fever hospital. In 1821 he united with Mr. Grainger in founding the Webb street school of medicine, where his lectures were exceedingly popular. His chief defect was immoderate egotism. He regarded himself as a great reformer in the healing art, and ridiculed almost all medical learning except his own. His lectures, edited by Joseph Rix, were published in 1834.

ARMSTRONG, Sir William George, an English engineer and inventor, born at Newcastle-upon-Tyne, Nov. 26, 1810. He was educated at Bishop-Auckland, and early busied himself with experiments in the physical sciences, the construction of models, &c. At his father's wish he began the study of law, though he had no inclination for that profession; he passed successfully through his preliminary studies, and became a partner in the firm with which he had been placed. But he devoted all his leisure to mechanical pursuits, and in 1888 produced his first invention, an important improvement in the hydraulic engine; and in 1845 he invented a hydraulic crane, which immediately proved one of the most useful machines of its kind. In 1842 he invented a machine for the production of electricity from steam. Mr. Armstrong was made a member of the royal society in 1846, and in the same year was one of a company to establish the Elswick iron works, at which his cranes are manufactured, with large engines, iron bridges, &c. In 1854, during the Crimean war, the attention of Mr. Armstrong was attracted to improvements in ordnance, and somewhat later he produced the plan of the breech-loading cannon which bears his name. For this and his other inventions he was knighted in 1859. The construction of iron-clad ships of war led him to make in 1861-'2 numerous experiments on the penetrability of iron plates; in the course of these he came to the conclusion that shot fired at moderate distances, from muzzle-loading, smooth-bored cannon of large calibre, possess greater power of penetrating and crushing iron plates than the projectiles of the breech-loading rifled ordnance. This result has excited much comment from eminent artillery officers in England and elsewhere. Since 1858 Sir William Armstrong has been engineer of the war department, and superintendent of the manufacture of cannon at the government foundery at Woolwich, and also manufactures a large number at his own works at Elswick.

ARMY, the organized body of armed men which a state maintains for the purposes of war. Of the armies of ancient history, the first of which we know anything positive is that of Egypt. Its epoch of glory coincides with the reign of Rhamses II. (Sesostris), and the paintings and inscriptions relating to his exploits on the monuments of his reign form the principal source of our knowledge on Egyptian military matters. The warrior caste of Egypt, according to Herodotus, was divided into two classes, *hermotybii* and *calasirii*, of which the first was 160,000 and the other 250,000 strong, in their best times. These two classes were distinguished from each other merely by their age or length of service, so that the calasirii, after a certain number of years, passed into the hermotybii or reserve. The whole army was settled in a sort of military colonies, an ample extent of land being set apart for each man as an equivalent for his services. These colonies were mostly situated in the lower part of the country, where attacks from the neighboring Asiatic states were to be anticipated; a few colonies only were established on the upper Nile, the Ethiopians not being very formidable opponents. The strength of the army, as shown by monumental records, lay in its infantry, and particularly in its archers. Besides these latter there were bodies of foot soldiers, variously armed and distributed into battalions, according to their arms, spearmen, swordsmen, clubmen, slingers, &c. The infantry was supported by numerous war chariots, each manned by two men, one to drive and the other to use the bow. Cavalry does not figure on the monuments. One solitary drawing of a man on horseback is considered to belong to the Roman epoch, and it appears certain that the use of the horse for riding and of cavalry became known to the Egyptians through their Asiatic neighbors only. That at a later period they had a numerous cavalry, acting, like all cavalry in ancient times, on the wings of the infantry, is certain. The defensive armor of the Egyptians consisted of shields, helmets, and breastplates, or coats of mail, of various materials. The mode of attacking a fortified position showed many of the means and artifices known to the Greeks and Romans. They had the *testudo* and battering ram, the *vinea* and scaling ladder; that they, however, also knew the use of movable towers, and that they undermined walls, as Sir G. Wilkinson maintains, is a mere supposition. From the time of Psammeticus a corps of Greek mercenaries was maintained; they were also colonized in lower Egypt.—Assyria furnishes us with the earliest specimen of those Asiatic armies which for above 1,000 years struggled for the possession of the countries between the Mediterranean and the Indus. There, as in Egypt, the monuments are our principal sources of information. The infantry appear armed like the Egyptian, though the bow seems less prominent, and the arms offensive and defensive are generally of better make. Spear, bow, sword, and dagger are the principal weapons. Assyrians in the army of Xerxes are also represented with iron-mounted clubs. The defensive armament consisted of a helmet (often very tastefully worked), a coat of mail of felt or leather, and a shield. The war chariots still formed an important portion of the army; each had two occupants, and the driver had to shelter the bowman with his shield. Many of those who fight in chariots are represented in long coats of mail. Then there was the cavalry, which here we meet with for the first time. In the earliest sculptures the rider mounts the bare back of his horse; later on, a sort of pad is introduced, and in one sculpture a high saddle is depicted, similar to that now used in the East. The cavalry can scarcely have been very different from that of the Persians and later eastern nations—light, irregular horse, attacking in disorderly swarms, easily repelled by a well armed, solid infantry, but formidable to a disordered or beaten army. Accordingly, it figured in rank below the charioteers, who appear to have formed the aristocratic arm of the service. In infantry tactics some progress toward regular movements and formations in ranks and files appears to have been made. The bowmen either fought in advance, where they were always covered each by a shield-bearer, or they formed the rear rank, the first and second ranks, armed with spears, stooping or kneeling to enable them to shoot. In sieges they certainly knew the use of movable towers and mining; and from a passage in Ezekiel, it would almost appear that they made some sort of mound or artificial hill to command the walls of the town—a rude beginning of the Roman *agger*. Their movable and fixed towers, too, were elevated to the height of the besieged wall, and higher, so as to command it. The ram and vinea they used also; and, numerous as their armies were, they turned whole arms of rivers into new beds in order to gain access to a weak front of the attacked place, or to use the dry bed of the river as a road into the fortress. The Babylonians seem to have had armies similar to those of the Assyrians, but special details are wanting.—The Persian empire owed its greatness to its founders, the warlike nomads of the present Farsistan, a nation of horsemen, with whom cavalry took at once that predominant rank which it has since held in all eastern armies, up to the recent introduction of modern European drill. Darius Hystaspis established a standing army in order to keep the conquered provinces in subjection, as well as to prevent the frequent revolts of the satraps or civil governors. Every province thus had its garrison, under a separate commander; fortified towns were occupied by detachments. The provinces had to bear the expense of maintaining these troops. To this standing army also belonged the guards of the king, 10,000 chosen infantry (called the "immortals"), resplendent with gold, followed on the march by a long train of carriages, with their harems and servants, and of camels with provisions, besides 1,000 halberdiers, 1,000 horse guards, and numerous war chariots, some of them armed with scythes. For expeditions of magnitude this armament was considered insufficient, and a general levy from all the provinces of the empire took place. The mass of these various contingents formed a truly oriental army, composed of the most heterogeneous parts, varying among themselves in armament and mode of fighting, and accompanied by immense trains of baggage and innumerable camp followers. It is to the presence of these latter that we must ascribe the enormous numbers of the Persian armies as estimated by the Greeks. The soldiers, according to their respective nationality, were armed with bows, javelins, spears, swords, clubs, daggers, slings, &c. The contingent of every province had its separate commander; they appear from Herodotus to have been divided by tens, hundreds, thousands, &c., with officers to command each decimal subdivision. The command of large corps or of the wings of the army was generally given to members of the royal family. Among the infantry the Persian and the other Aryan nations (Medes and Bactrians) formed the élite. They were armed with bows, spears of moderate size, and a short sword; the head was protected by a sort of turban, the body by a coat covered with iron scales; the shield was mostly of wickerwork. Yet this élite, as well as the rest of the Persian infantry, was generally beaten whenever it was opposed to even small bodies of Greeks, and its unwieldy and disorderly crowds appear quite incapable of any but passive resistance against the incipient phalanx of Sparta and Athens; witness Marathon, Thermopylæ, Platæa, and Mycale. The war chariots, which in the Persian army appear for the last time in history, might be useful on level ground against such a motley crowd as the Persian infantry themselves were; but against a solid mass of pikemen, such as the Greeks formed, or against light troops taking advantage of inequalities of ground, they were worse than useless. The least obstacle stopped them. In battle the horses got frightened, and, no longer under command, ran down their own infantry. As to the cavalry, the earlier periods of the empire give us little proof of its excellence. There were 10,000 horse on the plain of Marathon—a good cavalry country—yet they could not break the Athenian ranks. In later times it distinguished itself at the Granicus, where, formed in one line, it fell on the heads of the Macedonian columns as they emerged from the fords of the river, and broke them before they could deploy. It thus successfully opposed Alexander's advanced guard, under Ptolemy, for a long while, until the main body arrived and the light troops manœuvred on its flanks, when, having no second line or reserve, it had to retire. But at this period the Persian army had been strengthened by the infusion of a Greek element, imparted by the Greek mercenaries, who, soon after Xerxes, were taken into pay by the king; and the cavalry tactics displayed by Memnon on the Granicus are so thoroughly un-Asiatic that we may, in the absence of positive information, at once ascribe them to Greek influence.—The armies of Greece are the first of the detailed organization of which we have ample and certain information. With them the history of tactics, especially infantry tactics, may be said to begin. In Athens every free-born man was liable to military service. The holders of certain public offices alone, and in the earlier times the fourth or poorest class of freemen, were exempt. Every youth on attaining his 18th year was obliged to do duty for two years, especially in watching the frontiers. During this time his military education was completed; afterward he remained liable to service up to his 60th year. In case of war the assembled citizens fixed the number of men to be called out; in extreme cases only were the *levées en masse* (*panstratia*) resorted to. The *strategi*, ten of whom were annually elected by the people, had to levy these troops and to organize them, so that the men of each tribe, or *phyle*, formed a body under a separate phylarch. These officers, as well as the taxiarchs, or captains of companies, were equally elected by the people. The whole of this levy formed the heavy infantry (*hoplitæ*) destined for the phalanx or deep line formation of spearmen, which originally formed the whole of the armed force, and subsequently, after the addition of light troops and cavalry, remained its mainstay—the corps which decided the battle. The phalanx was commanded by a general with the title of *strategus*, and was formed in various depths; we find phalanxes 8, 12, and 25 men deep, mentioned in Grecian history. The armament of the hoplitæ consisted of a breastplate or corslet, helmet, oval target, spear, and short sword. The forte of the Athenian phalanx was attack; its charge was renowned for its furious impetus, especially after Miltiades at Marathon had introduced the quickening of the pace during the charge, so that they came down on the enemy with a run. On the defensive, the more solid and closer phalanx of Sparta was its superior. While at Marathon the whole force of the Athenians consisted of a heavy-armed phalanx of 10,000 hoplitæ, at Platæa they had, besides 8,000 hoplitæ, an equal number of light infantry. The tremendous pressure of the Persian invasions necessitated an extension of the liability to service; the poorest class, that of the *thetes*, was enrolled. They were formed into light troops (*gymnetæ*, *psili*); they had no defensive armor, or a target only, and were supplied with a spear and javelins. With the extension of the Athenian power, their light troops were reenforced by the contingents of their allies, and even by mercenary troops. Acarnanians, Ætolians, and Cretans, celebrated as archers and slingers, were added. A class of troops intermediate between them and the hoplitæ was formed, the *peltastæ*, armed like the light infantry, but capable of maintaining a position. They were of little importance until after the Peloponnesian war, when Iphicrates reorganized them. The light troops of the Athenians enjoyed a high reputation for intelligence and quickness both in resolution and in execution. On several occasions, probably in difficult ground, they even successfully opposed the Spartan phalanx. The Athenian cavalry was introduced at a time when the republic was already rich and powerful. The mountainous ground of Attica was unfavorable to this arm, but the neighborhood of Thessaly and Bœotia, countries rich in horses, and consequently the first to form cavalry, soon caused its introduction in the other states of Greece. The Athenian cavalry, first 300, then 600, and even 1,000 strong, was composed of the richest citizens, and formed a standing corps even in time of peace. They were a very effective body, extremely watchful, intelligent, and enterprising. Their position in battle, as well as that of the light troops, was generally on the wings of the phalanx. In later times the Athenians also maintained a corps of 200 mercenary mounted archers (*hippotoxotæ*). The Athenian soldier up to the time of Pericles received no pay. Afterward two oboli (besides two more for provisions, which the soldier had to find) were given, and sometimes even the hoplitæ received as much as two drachms. Officers received double pay, cavalry soldiers threefold, generals fourfold. The corps of heavy cavalry alone cost 40 talents (about $40,000) per annum in time of peace, during war considerably more. The order of battle and mode of fighting were extremely simple. The phalanx formed the centre, the men locking their spears and covering the whole front with their row of shields. They attacked the hostile phalanx in a parallel front. When the first onset was not sufficient to break the enemy's order, the struggle hand to hand with the sword decided the battle. In the mean time the light troops and cavalry either attacked the corresponding troops of the enemy, or attempted to operate on the flank and rear of the phalanx, and to take advantage of any disorder. In case of a victory they undertook the pursuit; in case of defeat they covered the retreat as much as possible. They were also used for reconnoitring expeditions and forays, they harassed the enemy on the march, especially when he had to pass a defile, and they tried to capture his convoys and stragglers. The phalanx always operated as a whole; its subdivisions into smaller bodies had no technical significance; their commanders had no other task than to see that the order of the phalanx was not broken, or was quickly restored. At the beginning of the Peloponnesian war, the Athenian army mustered 13,000 hoplitæ for field service, 61,000 (the youngest and the oldest soldiers) for garrison duty, 1,200 horsemen, and 1,600 archers. According to Böckh's calculations, the force sent against Syracuse numbered 38,560 men, and reënforcements despatched afterward, 26,000. The ruin of this expedition utterly exhausted the resources of Athens.—Sparta was preëminently the military state of Greece. The Spartans directed their attention mostly to strength, endurance, and hardiness. They valued steadiness in the ranks, and military point of honor, more than intelligence. As long as the phalanx decided the battle, the Spartan in the long run had the best of it. In Sparta every freeman was enrolled in the army lists from his 20th to his 60th year. The ephors determined the number to be called out, and they were generally chosen among the middle-aged men, from 30 to 40. As in Athens, the men belonging to the same tribe or locality were enrolled in the same body of troops. The organization of the army was based upon the confraternities (*enomotiæ*) introduced by Lycurgus, two of which formed a *pentecostys;* two of these were united into a *lochos*, and eight or four lochi into a *mora*. This was the organization in Xenophon's time; in former periods it appears to have varied. The strength of a mora is variously stated at from 400 to 900 men, and their number at one time was said to be 600. These various bodies of free Spartans formed the phalanx; the hoplitæ composing it were armed with a spear, a short sword, and a shield fastened round the neck. Later on, Cleomenes introduced the large Carian shield, fastened by a string on the left arm, and leaving both hands of the soldier free. The Spartans considered it disgraceful for their men to return after a defeat without their shields; the preservation of the shield proved the retreat to have been made in good order and in a compact phalanx, while single fugitives, running for their lives, of course had to throw away the clumsy shield. The Spartan phalanx was generally eight deep, but sometimes the depth was doubled by placing one wing behind the other. The men appear to have marched in step; some elementary evolutions were also in use, such as changing front to the rear by facing the men about, advancing or retiring a wing by wheeling, &c.; but they would seem to have been introduced at a later period only. In their best times, the Spartan phalanx, like that of Athens, knew the parallel front attack only. The ranks on the march were distant from each other six feet, in the charge three feet, and in a position receiving the charge only a foot and a half, from rank to rank. The army was commanded by one of the kings, who, with his suite (*damosia*), occupied a position in the centre of the phalanx. Afterward, the number of the free Spartans having considerably decreased, the strength of the phalanx was kept up by a selection from the subjected Periœci. The cavalry was never stronger than about 600 men, divided into troops (*ulami*) of 50 men; it merely covered the wings. There was besides a body of 300 mounted men, the élite of the Spartan youth, but they dismounted in battle, and formed a sort of bodyguard of hoplitæ around the king. Of light troops, there were the *skiritæ*, inhabitants of the mountains near Arcadia, who generally covered the left wing; the hoplitæ of the phalanx, besides, had Helot servants, who were expected in battle to do duty as skirmishers; thus, the 5,000 hoplitæ at Platæa brought 35,000 Helot light troops with them, but of the exploits of these latter we find nothing stated in history.—The simple tactics of the Greeks underwent considerable changes after the Peloponnesian war. At the battle of Leuctra, Epaminondas had to oppose with a small force of Thebans the far more numerous and hitherto invincible Spartan phalanx. The plain, parallel front attack here would have been equivalent to certain defeat, both wings being outflanked by the longer front of the enemy. Epaminondas, instead of advancing in line, formed his army into a deep column, and advanced against one wing of the Spartan phalanx, where the king had taken his station. He succeeded in breaking through the Spartan line at this, the decisive point; he then wheeled his troops round, and moving on either hand, he himself outflanked the broken line, which could not form a new front without losing its tactical order. At the battle of Mantinea the Spartans formed their phalanx with a greater depth, but nevertheless the Theban column again broke through it. Agesilaus in Sparta, and Timotheus, Iphicrates, and Chabrias in Athens, also introduced changes in infantry tactics. Iphicrates improved the peltastæ. They were armed with a small round target, strong linen corslet, and long spear of wood. Chabrias made the first ranks of the phalanx, when on the defensive, kneel down to receive the enemy's charge. Full squares, and other columns, &c., were introduced, and accordingly deployments formed part of the elementary tactics. At the same time, greater attention was paid to light infantry of all kinds; several species of arms were borrowed from the barbarous and semi-barbarous neighbors of the Greeks, such as archers, mounted and on foot, slingers, &c. The majority of the soldiers of this period consisted of mercenaries. The wealthy citizens, instead of doing duty themselves, found it more convenient to pay for substitutes. The character of the phalanx, as the preëminently national portion of the army, in which the free citizens of the state only were admitted, thus suffered from this admixture of mercenaries who had no right of citizenship. Toward the approach of the Macedonian epoch, Greece and her colonies were as much a mart for soldiers of fortune and mercenaries as Switzerland in the 18th century. The Egyptian kings had at an early time formed a corps of Greek troops. Afterward the Persian king gave his army some steadiness by the admission of a body of Greek mercenaries. The chiefs of these bodies were regular condottieri, as much as those of Italy in the 15th century. During this period warlike engines for throwing stones, darts, and incendiary projectiles were introduced, especially by the Athenians. Pericles already used some similar machines at the siege of Samos. Sieges were carried on by forming a line of contravallation, with ditch or parapet, round the place, investing it, and by the attempt to place the war engines in a commanding position near the walls. Mining was regularly made use of, to bring the walls down. At the assault, the column formed the *synaspismus*, the outer ranks holding their shields before them, and the inner ranks holding them over their heads, so as to form a roof (the testudo of the Romans) against the projectiles of the enemy.—While Greek skill was thus mainly directed toward shaping the flexible material of the mercenary bands into all sorts of novel and artificial formations, and in adopting or inventing new species of light troops, to the detriment of the ancient Doric heavy phalanx, which at that time alone could decide battles, a monarchy grew up which, adopting all real improvements, formed a body of heavy infantry of such colossal dimensions, that no army with which it came in contact could resist its shock. Philip of Macedon formed a standing army of about 30,000 infantry and 3,000 cavalry. The main body of the army was an immense phalanx of some 16,000 or 18,000 men, formed upon the principle of the Spartan phalanx, but improved in armament. The small Grecian shield was replaced by the large oblong Carian buckler, and the moderate-sized spear by the Macedonian pike (*sarissa*) of 24 feet in length. The depth of this phalanx varied under Philip from 8 to 10, 12, and 24 men. With the tremendous length of the pikes, each of the six front ranks could, on levelling them, make the points project in front of the first rank. The regular advance of such a long front of from 1,000 to 2,000 men presupposes a great perfection of elementary drill, which in consequence was continually practised. Alexander completed this organization. His phalanx was normally 16,384 men strong, or 1,024 in front by 16 deep. The file (*lochos*) of 16 men was conducted by a *lochagos*, who stood in the front rank. Two files formed a dilochy, two of which made a tetrarchy, two of which a taxiarchy, two of which a xenagy or syntagma, 16 men in front by 16 deep. This was the unit of evolution, the march being made in columns of xenagies, 16 in front. Sixteen xenagies (equal to eight pentecosiarchies, or four chiliarchies, or two telarchies) formed a small phalanx, two of which a diphalangarchy, and four a tetraphalangarchy or phalanx properly so called. Every one of these subdivisions had its corresponding officer. The diphalangarchy of the right wing was called head, that of the left wing tail, or rear. Whenever extraordinary solidity was required, the left wing took station behind the right, forming 512 men in front by 32 in depth. On the other hand, by deploying the eight rear ranks on the left of the front ranks, the extent of front could be doubled, and the depth reduced to eight. The distances of ranks and files were similar to those of the Spartans, but the close order was so compact that the single soldier in the middle of the phalanx could not turn. Intervals between the subdivisions of the phalanx were not allowed in battle; the whole formed one continuous line, charging *en muraille*. The phalanx was formed by Macedonian volunteers exclusively; though, after the conquest of Greece, Greeks also could enter it. The soldiers were all heavy-armed hoplitæ. Besides shield and pike, they carried a helmet and sword, although the hand-to-hand fight with the latter weapon cannot very often have been required after the charge of that forest of pikes. When the phalanx had to meet the Roman legion, the case indeed was different. The whole phalangite system, from the earliest Doric times down to the breaking up of the Macedonian empire, suffered from one great inconvenience; it wanted flexibility. Unless on a level and open plain, these long, deep lines could not move with order and regularity. Every obstacle in front forced it to form column, in which shape it was not prepared to act. Moreover, it had no second line or reserve. As soon, therefore, as it was met by an army formed in smaller bodies and adapted to turn obstacles of ground without breaking line, and disposed in several lines seconding each other, the phalanx could not help going into broken ground, where its new opponent completely cut it up. But to such opponents as Alexander had at Arbela, his two large phalanxes must have appeared invincible. Besides this heavy infantry of the line, Alexander had a guard of 6,000 *hypaspistæ*, still more heavily armed, with even larger bucklers and longer pikes. His light infantry consisted of *argyraspides*, with small silver-plated shields, and of numerous peltastæ, both of which troops were organized in semi-phalanxes of normally 8,192 men, being able to fight either in extended order or in line, like the hoplitæ; and their phalanx often had the same success. The Macedonian cavalry was composed of young Macedonian and Thessalian noblemen, with the addition subsequently of a body of horsemen from Greece proper. They were divided into squadrons (*ilæ*), of which the Macedonian nobility alone formed eight. They belonged to what we should call heavy cavalry; they wore a helmet and a cuirass with cuissarts of iron scales to protect the leg, and were armed with a long sword and pike. The horses, too, wore frontlets of iron. This class of cavalry, the *cataphracti*, received great attention both from Philip and Alexander; the latter used it for his decisive manœuvre at Arbela, when he first beat and pursued one wing of the Persians, and then, passing behind their centre, fell upon the rear of the other wing. They charged in various formations: in line, in common rectangular column, in rhomboid or wedge-shaped column. The light cavalry had no defensive armor; it carried javelins and light short lances. There was also a corps of *acrobalistæ* or mounted archers. These troops served for outpost duty, patrols, reconnoitring, and irregular warfare generally. They were the contingents of Thracian and Illyrian tribes, which also furnished some few thousands of irregular infantry. A new arm invented by Alexander claims our attention from the circumstance that it has been imitated in modern times—the *dimachæ*, mounted troops expected to fight either as cavalry or as infantry. The dragoons of the 16th and following centuries, as well as the light cavalry and mounted infantry of our own day, are complete counterparts to these ancient dimachæ. We have no exact information as to the success with which the dimachæ were used. The foregoing statement describes the composition of the army with which Alexander conquered the country between the Mediterranean, the Oxus, and the Sutlej. As to its strength at Arbela, it consisted of two large phalanxes of hoplitæ (say 30,000 men), two semi-phalanxes of peltastæ (16,000), 4,000 cavalry, and 6,000 irregular troops; in all about 56,000 men. At the Granicus, his force of all arms was 35,000 men, of whom 5,000 were cavalry.—The armies of the successors of Alexander show no improvements on his formations. The introduction of elephants was but of short duration; when terrified by fire, these animals were more formidable to their own troops than to the enemy. The later Greek armies, under the Achæan league, were formed partly on the Macedonian, partly on the Roman system.—Of the Carthaginian army we know no details; even the strength of the force with which Hannibal passed the Alps is disputed.—The Roman army presents us with the most perfect system of infantry tactics invented during the time when the use of gunpowder was unknown. It maintained the predominance of heavy infantry and compact bodies, but added to it mobility of the separate smaller bodies, the possibility of fighting in broken ground, the disposition of several lines one behind the other, partly as supports and reliefs, partly as a powerful reserve, and finally a system of training the single soldier which was even more to the purpose than that of Sparta. The Romans accordingly overthrew every armament opposed to them, the Macedonian phalanx as well as the Numidian horse. In Rome every citizen from his 17th to his 45th or 50th year was liable to serve, unless he belonged to the lowest class, or had served in 20 campaigns on foot, or 10 campaigns as a horseman. Generally the younger men only were selected. The drill of the soldier was very severe, and calculated to develop his bodily powers in every imaginable way. Running, jumping, vaulting, climbing, wrestling, swimming, first naked, then in full armament, were largely practised, besides the regular drill in the use of the arms and the various movements. Long marches in heavy marching order, every soldier carrying from 35 to 60 lbs., were kept up at the rate of four miles an hour.

The use of the intrenching tools, and the throwing up of intrenched camps in a short time, also formed part of the military education; and not only the recruit, but even the legions of veterans, had to undergo all these exercises in order to keep their bodies fresh and supple, and to remain inured to fatigue and want. In the best times of the republic there were generally two consular armies, each consisting of two legions and the contingents of the allies (in infantry of equal strength, cavalry double the strength of the Romans). The levy of the troops was made in a general assembly of the citizens at the capitol or on the Campus Martius; an equal number of men was taken from every tribe, which was again equally subdivided among the four legions, until the number was completed. Very often citizens, freed from service by age or their numerous campaigns, entered again as volunteers. The recruits were then sworn in and dismissed until required. When called in, the youngest and poorest were taken for the *velites*, the next in age and means for the *hastati* and *principes*, the oldest and wealthiest for the *triarii*. Every legion counted 1,200 velites, 1,200 hastati, 1,200 principes, 600 triarii, and 300 horsemen (knights); in all, 4,500. The hastati, principes, and triarii were each divided into ten *manipuli* or companies, and an equal number of velites attached to each. The velites (*rorarii*, *accensi*, *ferentarii*) formed the light infantry of the legion, and stood on its wings along with the cavalry. The hastati formed the first, the principes the second line; they were originally armed with spears. The triarii formed the reserve, and were armed with the *pilum*, a short but extremely heavy and dangerous spear, which they threw into the front ranks of the enemy immediately before engaging him sword in hand. Every manipulus was commanded by a centurion, having a second centurion for his lieutenant. The centurions ranked through the whole of the legion, from the second centurion of the last or tenth manipulus of the hastati to the first centurion of the first manipulus of the triarii (*primus pilus*), who, in the absence of a superior officer, even took the command of the whole legion. Commonly, the primus pilus commanded all the triarii, the same as the primus princeps (first centurion of first manipulus of principes), all the principes and the primus hastatus, and all the hastati of the legion. The legion was commanded in the earlier times in turns by its six military tribunes; each of them held the command for two months. After the first civil war, legates were placed as standing chiefs at the head of every legion; the tribunes now were mostly officers intrusted with the staff or administrative business. The difference of armament of the three lines had disappeared before the time of Marius. The pilum had been given to all three lines of the legion; it was now the national arm of the Romans. The qualitative distinction between the three lines, as far as it was based upon age and length of service, soon disappeared too. In the battle of Metellus against Jugurtha, there appeared, according to Sallust, for the last time hastati, principes, and triarii. Marius now formed out of the 30 manipuli of the legion 10 cohorts, and disposed them in two lines of five cohorts each. At the same time, the normal strength of the cohort was raised to 600 men; the first cohort, under the primus pilus, carried the legionary eagle. The cavalry remained formed in *turmæ* of 30 rank and file and three decurions, the first of whom commanded the turma. The armature of the Roman infantry consisted of a shield of semicylindric shape, 4 feet by 2½, made of wood, covered with leather and strengthened with iron fastenings; in the middle it had a boss (*umbo*) to parry off spear thrusts. The helmet was of brass, generally with a prolongation behind to protect the neck, and fastened on with leather bands covered with brass scales. The breastplate, about a foot square, was fastened on a leather corslet with scaled straps passing over the shoulder; for the centurions, it consisted of a coat of mail covered with brass scales. The right leg, exposed when advanced for the sword thrust, was protected by a brass plate. Besides the short sword, which was used for thrusting more than for cutting, the soldier carried the pilum, a heavy spear 4½ feet wood with a projecting iron point of 1½ foot, or nearly 6 feet in all long, but 2½ inches square in the wood, and weighing about 10 or 11 lbs. When thrown at 10 or 15 paces distance, it often penetrated shield and breastplate, and almost always threw down its man. The velites, lightly equipped, carried light short javelins. In the later periods of the republic, when barbaric auxiliaries undertook the light service, this class of troops disappeared entirely. The cavalry were provided with defensive armor similar to that of the infantry, a lance, and a longer sword. But the Roman national cavalry was not very good, and preferred to fight dismounted. In later periods Numidian, Spanish, Gallic, and German horsemen supplanted it. The tactical disposition of the troops admitted of great mobility. The manipuli were formed at intervals equal to their extent of front; the depth varied from 5 or 6 to 10 men. The manipuli of the second line were placed behind the intervals of the first; the triarii still further to the rear, but in one unbroken line. According to circumstances, the manipuli of each line could close up or form line without intervals, or those of the second line could march up to fill the intervals of the first; or else, where greater depth was required, the manipuli of the principes closed up each in rear of the corresponding manipulus of the hastati, doubling its depth. When opposed to the elephants of Pyrrhus, the three lines all formed with intervals, each manipulus covering the one in its front, so as to leave room for the animals to pass straight through the order of battle. In this formation the clumsiness of the phalanx was in every way successfully overcome. The legion could move and manœuvre, without breaking its order of battle, in ground where the phalanx durst not venture without the utmost risk. One or two manipuli at most would have to shorten their front to defile past an obstacle; in a few moments the front was restored. The legion could cover the whole of its front by light troops, as they could retire, on the advance of the line, through the intervals. But the principal advantage was the disposition in a plurality of lines, brought into action successively, according to the requirements of the moment. With the phalanx, one shock had to decide. No fresh troops were in reserve to take up the fight in case of a reverse; in fact, that case was never provided for. The legion could engage the enemy with its light troops and cavalry on the whole of his front; could oppose to the advance of his phalanx its first line of hastati, which was not so easily beaten, as at least six of the ten manipuli had first to be broken singly; could wear out the strength of the enemy by the advance of the hastati, and finally decide the victory by the triarii. Thus the troops and the progress of the battle remained in the hands of the general, while the phalanx, once engaged, was irretrievably engaged, with all its strength, and had to see the battle out. If the Roman general desired to break off the combat, the legionary organization permitted him to take up a position with his reserves, while the troops engaged before retired through the intervals, and took up a position in their turn. Under all circumstances, there was always a portion of the troops in good order, for even if the triarii were repulsed, the two first lines had reformed behind them. When the legions of Flamininus met Philip's phalanx in the plains of Thessaly, their first attack was at once repulsed; but charge following charge, the Macedonians got tired and lost part of their compactness of formation; and wherever a sign of disorder manifested itself, there was a Roman manipulus to attempt an inroad into the clumsy mass. At last, 20 manipuli attacking the flanks and rear of the phalanx, tactical continuity could no longer be maintained; the deep line dissolved into a swarm of fugitives, and the battle was lost. Against cavalry, the legion formed the *orbis*, a sort of square with baggage in the centre. On the march, when an attack was to be apprehended, it formed the *legio quadrata*, a sort of lengthened column with a wide front, baggage in the centre. This was of course possible in the open plain only where the line of march could go across the country.—In Cæsar's time the legions were mostly recruited by voluntary enlistment in Italy. After the social war, the right of citizenship, and with it liability for service, had been extended to all Italy. The pay was about equal to the earnings of a laborer; recruits, therefore, were plentiful, even without having recourse to the conscription. In exceptional cases only were legions recruited in the provinces; thus Cæsar had his fifth legion recruited in Roman Gaul, but afterward it received the Roman naturalization *en masse*. The legions were far from having the nominal strength of 4,500 men; those of Cæsar were seldom much above 3,000. Levies of recruits were formed into new legions (*legiones tironum*), rather than mixed with the veterans in the old legions; these new legions were at first excluded from battles in the open field, and principally used for guarding the camp. The legion was divided into ten cohorts of three manipuli each. The names of hastati, principes, and triarii were maintained as far as necessary to denote the rank of officers according to the system indicated above; as to the soldiers, these names had lost all significance. The six centurions of the first cohort of each legion were by right present at councils of war. The centurions rose from the ranks, and seldom attained higher command; the school for superior officers was in the personal staff of the general, consisting of young men of education, who soon advanced to the rank of *tribuni militum*, and later on to that of *legati*. The armament of the soldier remained the same: pilum and sword. Besides his accoutrements, the soldier carried his personal baggage, weighing from 85 to 60 pounds. The contrivance for carrying it was so clumsy that the baggage had first to be deposited before the soldier was ready for battle. The camp utensils of the army were carried on the backs of horses and mules, of which a legion required about 500. Every legion had its eagle, and every cohort its colors. For light infantry, Cæsar drew from his legions a certain number of men (*antesignani*) equally fit for light service and for close fight in line. Besides these, he had his provincial auxiliaries, Cretan archers, Balearic slingers, Gallic and Numidian contingents, and German mercenaries. His cavalry consisted partly of Gallic, partly of German troops. The Roman velites and cavalry had disappeared some time before. The staff of the army consisted of the *legati*, appointed by the senate, the lieutenants of the general, whom he employed to command detached corps, or portions of the order of battle. Cæsar for the first time gave to every legion a legate as standing commander. If there were not legates enough, the quæstor, too, had to take the command of a legion. He was properly the paymaster of the army and chief of the commissariat, and was assisted in this office by numerous clerks and orderlies. Attached to the staff were the *tribuni militum*, and the young volunteers above mentioned (*contubernales*, *comites prætorii*), doing duty as adjutants or orderly officers; but in battle they fought in line, the same as private soldiers, in the ranks of the *cohors prætoria*, consisting of the lictors, clerks, servants, guides (*speculatores*), and orderlies (*apparitores*) of the headquarters. The general had a sort of personal guard, consisting of veterans, who had voluntarily reënlisted on the call of their former chief. This troop, mounted on the march, but fighting on foot, was considered the élite of the army; it carried and guarded the *vexillum*, the signal banner for the whole army. In battle, Cæsar generally fought in three lines, four cohorts per legion in the first, and three in the second and third lines each; the cohorts of the second line dressed on the intervals of the first. The second line had to relieve the first; the third line formed a general reserve for decisive manœuvres against the front or flank of the enemy, or for parrying his decisive thrusts. Wherever the enemy so far outflanked the line that its prolongation became necessary, the army was disposed in two lines only. One single line (*acies simplex*) was made use of in an extreme case of need only, and then without intervals between the cohorts; in the defence of a camp, however, it was the rule, as the line was still eight to ten deep, and could form a reserve from the men who had no room on the parapet.—Augustus completed the work of making the Roman troops a regular standing army. He had 25 legions distributed all over the empire, of which eight were on the Rhine (considered the main strength of the army), three in Spain, two in Africa, two in Egypt, four in Syria and Asia Minor, six in the Danubian countries. Italy was garrisoned by chosen troops recruited exclusively in that country, and forming the imperial guard; this consisted of 12, later on of 14 cohorts; and the city of Rome had also 7 cohorts of municipal guards (*vigiles*), formed originally from emancipated slaves. Besides this regular army, the provinces had to furnish, as formerly, their light auxiliary troops, now mostly reduced to a sort of militia for garrison and police duty. On menaced frontiers, however, not only these auxiliary troops, but foreign mercenaries also, were employed in active service. The number of legions increased under Trajan to 30, under Septimius Severus to 33. The legions, besides their numbers, had names, taken from their stations (*L. Germanica*, *L. Italica*), from emperors (*L. Augusta*), from gods (*L. Primigenia*, *L. Apollinaris*), or conferred as honorary distinctions (*L. fidelis*, *L. pia*, *L. invicta*). The organization of the legion underwent some changes. The commander was now called *præfectus*. The first cohort was doubled in strength (*cohors milliaria*), and the normal strength of the legion raised to 6,100 infantry and 726 cavalry; this was to be the minimum, and in case of need one or more cohortes milliariæ were to be added. The cohors milliaria was commanded by a military tribune, the others by tribunes or *præpositi;* the rank of *centurio* was thus confined to subalterns. The admission of liberated or non-liberated slaves, natives of the provinces, and all sorts of people into the legions, became the rule; Roman citizenship being required for the prætorians in Italy only, and even there this was abandoned in later times. The Roman nationality of the army was thus very soon drowned in the influx of barbaric and semi-barbaric, Romanized and non-Romanized elements; the officers alone maintained the Roman character. This deterioration of the elements composing the army very soon reacted upon its armament and tactics. The heavy breastplate and pilum were thrown aside; the toilsome system of drill, which had formed the conquerors of the world, was neglected; camp-followers and luxuries became necessary to the army, and the *impedimenta* (train of baggage) increased as strength and endurance decreased. As had been the case in Greece, the decline was marked by neglect of the heavy line infantry, by a foolish fancy for all sorts of light armament, and by the adoption of barbaric equipments and tactics. Thus we find innumerable classifications of light troops (*auxiliatores*, *exculcatores*, *jaculatores*, *excursatores*, *præcursatores*, *scutati*, *funditores*, *balistarii*, *tragularii*), armed with all sorts of projectiles; and we are told by Vegetius that the cavalry had been improved in imitation of the Goths, Alans, and Huns. Finally, all distinction of equipment and armament between Romans and barbarians ceased, and the Germans, physically and morally superior, marched over the bodies of the un-Romanized legions. The conquest of the West by the Germans thus was opposed by but a small remnant, a dim tradition of the ancient Roman tactics; but even this small remnant was now destroyed.—The whole of the middle ages is as barren a period for the development of tactics as for that of any other science. The feudal system, though in its very origin a military organization, was essentially opposed to discipline. Rebellions and secessions of large vassals, with their contingents, were of regular occurrence. The distribution of orders to the chiefs turned generally into a tumultuous council of war, which rendered all extensive operations impossible. Wars, therefore, were seldom directed on decisive points; struggles for the possession of a single locality filled up entire campaigns. The only operations of magnitude occurring in all this period (passing over the confused times from the 6th to the 12th century) are the expeditions of the German emperors against Italy, and the crusades, the one as resultless as the other.—The infantry of the middle ages, composed of the feudal retainers and part of the peasantry, was chiefly composed of pikemen, and mostly contemptible. It was great sport for the knights, covered with iron, to ride singly into this unprotected rabble, and lay about them with a will. A portion of the infantry was armed on the continent of Europe with the crossbow, while in England the longbow became the national weapon of the peasantry. This longbow was a very formidable weapon, and secured the superiority of the English over the French at Crécy, Poitiers, and Agincourt. Easily protected against rain, which rendered the crossbow unserviceable at times, it projected its arrow to distances above 200 yards, or not much less than the effective range of the old smooth-bore musket. The arrow penetrated a one-inch board, and would even pass through a breastplate. Thus it long maintained its place even against the first small firearms, especially as six arrows could be shot off while the musket of that epoch could be loaded and fired once; and as late as the end of the 16th century Queen Elizabeth attempted to reintroduce the national longbow as a weapon of war. It was especially effective against cavalry; the arrows, even if the armor of the men-at-arms was proof against them, wounded or killed the horses, and the unhorsed knights were thereby disabled, and generally made prisoners. The archers acted either in skirmishing order or in line.—Cavalry was the decisive arm of the middle ages. The knights in full armor formed the first effective body of heavy cavalry, charging in regular formation, which we meet with in history; for Alexander's cataphracti, though they decided the day at Arbela, were so much an exception that we hear nothing more of them after that day. The only progress, then, which the middle ages bequeathed to us, was the creation of a cavalry, from which our modern mounted service descends. And yet, what a clumsy thing this cavalry was, is proved by the one fact that during the whole middle ages the cavalry was the heavy, slow-moving arm, while all light service and quick movements were executed by infantry. The knights, however, did not always fight in close order. They preferred duels with single opponents, or spurring their horses into the midst of the hostile infantry; thus the mode of fighting out a battle was carried back to the Homeric times. When they did act in close order, they charged either in line (one deep, the more lightly armed esquires forming the second rank) or in deep column. Such a charge was undertaken, as a rule, against the knights (men-at-arms) only of the opposing army; upon its infantry it would have been wasted. The horses, heavily laden with their own as well as their riders' armor, could run but slowly and for short distances. During the crusades, therefore, and in the wars with the Mongolians in Poland and Silesia, this immovable cavalry was constantly tired out, and finally worsted by the active light horsemen of the East. In the Austrian and Burgundian wars against Switzerland, the men-at-arms, entangled in difficult ground, had to dismount and form a phalanx even more immovable than that of Macedon; in mountain defiles, rocks and stumps of trees were hurled down upon them, in consequence of which the phalanx lost its tactical order, and was scattered by a resolute attack. Toward the 14th century a kind of lighter cavalry was introduced, and a portion of the archers were mounted to facilitate their manœuvring; but these and other changes were soon rendered useless, abandoned, or turned to different account by the introduction of that new element, which was destined to change the whole system of warfare, gunpowder.—From the Arabs in Spain the knowledge of the composition and use of gunpowder spread to France and the rest of Europe; the Arabs themselves had received it from nations further east, who again had it from the original inventors, the Chinese. In the first half of the 14th century cannon were first introduced into European armies—heavy, unwieldy pieces of ordnance, throwing stone balls, and unfit for anything but sieges. Small arms, however, were soon invented. Perugia supplied itself in 1364 with 500 hand-guns, the barrels not more than eight inches long; they subsequently gave rise to the manufacture of pistols (so called from Pistoia in Tuscany). Not long afterward longer and heavier hand-guns (*arquebuses*) were manufactured, corresponding to our present musket; but, short and heavy in the barrel, they had but a restricted range, and the matchlock was an almost absolute hindrance to correct aim. Toward the close of the 14th century there was no military force in western Europe without its artillery and arquebusiers. But the influence of the new arm on general tactics was not yet perceptible. Both large and small firearms took a long time in loading, and what with their clumsiness and costliness, they had not superseded the crossbow by 1450.—In the mean time the general breaking up of the feudal system, and the rise of cities, contributed to change the composition of armies. The larger vassals were either subdued by central authority, as in France, or had become quasi-independent sovereigns, as in Germany and Italy. The power of the lesser nobility was broken by the central authority in conjunction with the cities. The feudal armies no longer existed; new armies were formed from the mercenaries whom the ruin of feudalism had set free to serve those who would pay them. Thus, something approaching standing armies arose; but these mercenaries, men of all nations, difficult to keep in order, and not very regularly paid, committed great excesses. In France, King Charles VII. therefore formed a permanent force from native elements. In 1445 he levied 15 *compagnies d'ordonnance* of 600 men each; in all, 9,000 cavalry, stationed in the towns of the kingdom, and paid with regularity. Every company was divided into 100 lances; a lance consisted of one man-at-arms, three archers, an esquire, and a page. Thus they formed a mixture of heavy cavalry with mounted archers, the two arms in battle acting of course separately. In 1448 he added 16,000 *francs-archers*, under four captains general, each commanding eight companies of 500 men. All the archers had crossbows. They were recruited and armed by the parishes, and free from all taxes. This may be considered the first standing army of modern times.—At the close of this first period of modern tactics, as they emerged from mediæval confusion, the state of things may be summed up as follows: The main body of the infantry, consisting of mercenaries, was armed with pike and sword, breastplate and helmet. It fought in deep, close masses, but, better armed and drilled than the feudal infantry, it showed greater tenacity and order in combat. The standing levies and the mercenaries, soldiers by profession, were of course superior to the casual levies and disconnected bands of feudal retainers. The heavy cavalry now found it sometimes necessary to charge in close array against infantry. The light infantry was still principally composed of archers, but the use of the hand-gun for skirmishers gained ground. The cavalry remained as yet the principal arm—heavy cavalry, men-at-arms encased in iron, but no longer composed in every case of the nobility, and reduced from its former chivalrous and Homeric mode of fighting to the more prosaic necessity of charging in close order. But the unwieldiness of such cavalry was now generally felt, and many devices were planned to find a lighter kind of horse. Mounted archers, as has been stated, had in part to supply this want; in Italy and the neighboring countries the *stradioti*, light cavalry on the Turkish plan, composed of Bosnian and Albanian mercenaries, a sort of bashi-bazouks, found ready employment, and were much feared, especially in pursuits. Poland and Hungary had, besides the heavy cavalry adopted from the West, retained their own national light cavalry. The artillery was in its infancy. The heavy guns of the time were indeed taken into the field, but could not leave their position after it was once taken up; the powder was bad, the loading difficult and slow, and the range of the stone balls short.—The close of the 15th and the beginning of the 16th century are marked by a double progress; the French improved the artillery, and the Spaniards gave a new character to the infantry. Charles VIII. of France made his guns so far movable that he could not only take them into the field, but make them change their position during battle and follow the other troops in their movements, which, however, were not very quick. He thereby became the founder of field artillery. His guns, mounted on wheeled carriages and plentifully horsed, proved immensely superior to the old-fashioned clumsy artillery of the Italians drawn by bullocks, and did such execution in the deep columns of the Italian infantry, that Machiavelli wrote his "Art of War" principally in order to propose formations by which the effect of such artillery on infantry could be counteracted. In the battle of Marignano, Francis I. of France defeated the Swiss pikemen by the effective fire and the mobility of this artillery, which, from flanking positions, enfiladed the Swiss order of battle. But the reign of the pike, for infantry, was on the decline. The Spaniards improved the common hand-gun (*arquebuse*) and introduced it into the regular heavy infantry. Their musket (*hacquebutte*) was a heavy, long-barrelled arm, bored for two-ounce bullets, and fired from a rest formed by a forked pole. It sent its bullet through the strongest breastplate, and was therefore decisive against the heavy cavalry, which got into disorder as soon as the men began falling. Ten or 15 musketeers were placed with every company of pikemen, and the effect of their fire at Pavia astonished both allies and enemies. Frundsberg relates that in that battle a single shot from such a musket would bring down several men and horses. From that time dates the superiority of the Spanish infantry, which lasted for above 100 years.—The war consequent upon the rebellion of the Netherlands was of great influence on the formation of armies. Both Spaniards and Dutch improved all arms considerably. Hitherto, in the armies of mercenaries, every man offering for enlistment had to come fully equipped, armed, and acquainted with the use of his arms. But in this long war, carried on during 40 years on a small extent of country, the available recruits of this class soon became scarce. The Dutch had to put up with such able-bodied volunteers as they could get, and the government was now under the necessity of seeing them drilled. Maurice of Nassau composed the first drill regulations of modern times, and thereby laid the foundation for the uniform instruction of a whole army. The infantry began again to march in step; it gained much in homogeneity and solidity. It was now formed into smaller bodies; the companies, hitherto 400 to 500, were reduced to 150 and 200 men, 10 companies forming a regiment. The improved musket gained ground upon the pike; one third of the whole infantry consisted of musketeers, mixed in each company with the pikemen. These latter, being required for hand-to-hand fight only, retained their helmet, breastplate, and steel gauntlets; the musketeers threw away all defensive armor. The formation was generally two deep for the pikemen, and from five to eight deep for the musketeers; as soon as the first rank had fired, it retired to load again. Still greater changes took place in cavalry, and here, too, Maurice of Nassau took the lead. In the impossibility of forming a heavy cavalry of men-at-arms, he organized a body of light horse recruited in Germany, armed them with a helmet, cuirass, brassarts for the arms, steel gauntlets, and long boots; and as with the lance they would not have been a match for the heavy-armed Spanish cavalry, he gave them a sword and long pistols. This new class of horsemen, approaching our modern cuirassiers, soon proved superior to the far less numerous and less movable Spanish men-at-arms, whose horses they shot down before the slow mass broke in upon them. Maurice of Nassau had his cuirassiers drilled as well as his infantry; he so far succeeded, that he could venture to execute in battle changes of front and other evolutions with large or small bodies of them. Alva, too, had found the necessity of improving his light horse; hitherto they had been fit for skirmishing and single combat only, but under his direction they soon learned to charge in a body, like the heavy cavalry. The formation of cavalry remained still five to eight deep. About this time Henry IV. of France introduced a new kind of mounted service, the dragoons, originally infantry mounted on horses for quicker locomotion only; but in a very few years after their introduction they were used as cavalry as well, and equipped for this double service. They had neither defensive armor nor high boots, but a cavalry sword, and sometimes a lance; they also carried the infantry musket, or a shorter carbine. These troops did not, however, come up to the expectations which had led to their formation; they soon became a portion of the regular cavalry, and ceased to fight as infantry. In artillery the French maintained the superiority they had gained. The *prolonge* was invented by them about this time, and case shot introduced by Henry IV. The Spanish and Dutch, too, lightened and simplified their artillery, but still it remained a clumsy concern, and light, movable pieces of effective calibre and range were yet unknown.—With the 30 years' war opens the period of Gustavus Adolphus, the great military reformer of the 17th century. His infantry regiments were composed of two thirds musketeers and one third pikemen. Some regiments consisted of musketeers alone. The muskets were so much lightened that the rest for firing them became unnecessary. He also introduced paper cartridges, by which loading was much facilitated. The deep formation was done away with; his pikemen stood six, his musketeers only three deep. These latter were drilled in firing by platoons and ranks. The unwieldy regiments of 2,000 or 3,000 men were reduced to 1,300 or 1,400, in eight companies, and two regiments formed into a brigade. With this formation he defeated the deep masses of his opponents, often disposed, like a column or full square, 30 deep, upon which his artillery played with terrible effect. The cavalry was reorganized upon similar principles. The men-at-arms were completely done away with. The cuirassiers lost the brassarts and some other useless pieces of defensive armor; they were thus made considerably lighter and more movable. His dragoons fought nearly always as cavalry. Both cuirassiers and dragoons were formed only three deep, and had strict orders not to lose time with firing, but to charge at once sword in hand. They were divided into squadrons of 125 men. The artillery was improved by the addition of light guns. The leather guns of Gustavus Adolphus are celebrated, but were not long retained. They were replaced by cast-iron four-pounders, so light that they could be drawn by two horses; they could be fired six times while a musketeer fired twice; two of these were attached to every regiment of infantry. Thus, the division of light and heavy field artillery was established; the light guns accompanied the infantry, while the heavy ones remained in reserve, or took up a position for the whole of the battle. The armies of this time begin to show the increasing preponderance of infantry over cavalry. At the battle of Leipsic, Gustavus Adolphus had 19,000 infantry and 11,000 cavalry; Tilly had 31,000 infantry and 13,000 cavalry. At Lützen, Wallenstein had 24,000 infantry and 16,000 cavalry in 170 squadrons. The number of guns, too, increased with the introduction of light pieces; the Swedes often had from 5 to 12 guns for every 1,000 men; and at the battle of the Lech, Gustavus Adolphus forced the passage of the river under cover of the fire of 72 heavy guns.—During the latter half of the 17th and the first half of the 18th century, pikes and all defensive armor for infantry were finally done away with by the general introduction of the bayonet. This weapon, invented in France about 1640, had to struggle 80 years against the pike. The Austrians first adopted it for all their infantry, the Prussians next; the French retained the pike till 1703, the Russians till 1721. The flint-lock, invented in France about the same time as the bayonet, was also gradually introduced before the year 1700 into most armies. It materially abridged the operation of loading, protected to some degree the powder in the pan from rain, and thus contributed very much to the abolition of the pike. Yet firing was still so slow that a man was not expected to use more than from 24 to 36 cartridges in a battle; until in the latter half of this period improved regulations, better drill, and further improvement in the construction of small arms (especially the iron ramrod, first introduced in Prussia), enabled the soldier to fire with considerable rapidity. This necessitated a still further reduction of the depth of formation, and infantry was now formed only four deep. A species of élite infantry was created in the companies of grenadiers, originally intended to throw hand-grenades before coming to close quarters, but soon reduced to fight with the musket only. In some German armies riflemen had been formed as early as the 30 years' war; the rifle itself had been invented at Leipsic in 1498. This arm was now mixed with the musket, the best shots in each company being armed with it; but out of Germany the rifle found little favor. The Austrians had also a sort of light infantry called *pandours*—Croatian and Servian irregulars from the military frontier against Turkey, useful in roving expeditions and pursuit, but, from the tactics of the day and their absolute want of drill, useless in battle. The French and Dutch created, for similar purposes, irregular infantry called *compagnies franches*. Cavalry, too, was lightened in all armies. There were no longer any men-at-arms; the cuirassiers maintained the breastplate and helmet only; in France and Sweden the breastplate was also done away with. The increasing efficiency and rapidity of infantry fire told very much against cavalry. It was soon considered perfectly useless for this latter arm to charge infantry sword in hand; and the opinion of the irresistibility of a firing line became so prevalent that cavalry, too, was taught to rely more on its carbines than on the sword. Thus, during this period, it often occurred that two lines of cavalry maintained a firing fight against each other the same as if they were infantry; and it was considered very daring to ride up to within 20 yards of the enemy, fire a volley, and charge at a trot. Charles XII., however, adhered to the rule of his great predecessor. His cavalry never stopped to fire; it always charged, sword in hand, against anything opposing it, cavalry, infantry, batteries, and intrenchments, and always with success. The French, too, broke through the new system and recommenced relying on the sword only. The depth of cavalry was still further reduced from four to three. In artillery, the lightening of the guns, and the use of cartridges and case-shot, now became general. Another great change was that of the incorporation of this arm with the army. Hitherto, though the guns belonged to the state, the men serving them were not soldiers, but formed a sort of guild, and artillery was considered not an arm but a handicraft. The officers had no rank in the army, and were considered more related to master tailors and carpenters than to gentlemen. About this time, however, artillery was made a component part of the army, and divided into companies and battalions; the men were converted into permanent soldiers, and the officers ranked with the infantry and cavalry. The centralization and permanence of the armed contingent upon this change paved the way for the science of artillery, which under the old system could not develop itself.—The passage from deep formation to line, from the pike to the musket, from the supremacy of cavalry to that of infantry, had thus been gradually accomplished when Frederick the Great opened his campaigns, and with them the classical era of line tactics. He formed his infantry three deep, and got it to fire five times in a minute. In his very first battle at Mollwitz, this infantry deployed in line, and repelled by its rapid fire all charges of the Austrian cavalry, which had just totally routed the Prussian horse; after finishing with the cavalry, the Prussian infantry attacked the Austrian infantry, defeated it, and thus won the battle. Formation of squares against cavalry was never attempted in great battles, but only when infantry on the march was surprised by hostile cavalry. In a battle, the extreme wings of the infantry stretched round *en potence* when menaced by cavalry, and this was generally found sufficient. To oppose the Austrian pandours, Frederick formed similar irregular troops, infantry and cavalry, but never relied on them in battle, where they were seldom engaged. The slow advance of the firing line decided his battles. Cavalry, neglected under his predecessor, was now made to undergo a complete revolution. It was formed only two deep, and firing, except on pursuit, was strictly prohibited. Horsemanship, considered hitherto of minor importance, was now cultivated with the greatest attention. All evolutions had to be practised at full speed, and the men were required to remain well closed up. By the exertions of Seydlitz, the cavalry of Frederick was made superior to any other then existing or ever existing before it; and its bold riding, close order, dashing charge, and quick rallying have never yet been surpassed. The artillery was considerably lightened, so much that some of the heavy-calibred guns were not able to stand full charges, and had therefore to be abolished afterward. Yet the heavy artillery was still very slow and clumsy in its movements, owing to inferior and heavy carriages and imperfect organization. In battle, it took up its position from the first, and sometimes changed it for a second position, more in advance; but manœuvring there was none. The light artillery, the regimental guns attached to the infantry, were placed in front of the infantry line, 50 paces in advance of the intervals of the battalions; they advanced with the infantry, the guns dragged by the men, and opened fire with canister at 300 yards. The number of guns was very large, from three to six guns per 1,000 men. The infantry, as well as the cavalry, were organized in brigades and divisions; but as there was scarcely any manœuvring after the battle had begun, and as every battalion had to remain in its proper place in the line, these subdivisions had no tactical influence. With the cavalry, a general of brigade might now and then, during a charge, have to act upon his own responsibility; but with the infantry such a case could never occur. This line formation, infantry in two lines in the centre, cavalry in two or three lines on the wings, was a considerable progress upon the deep formation of former days. It developed the full effect of infantry fire, as well as of the charge of cavalry, by allowing as many men as possible to act simultaneously; but its very perfection in this point confined the whole army, as it were, in a strait waistcoat. Every squadron, battalion, or gun had its regulated place in the order of battle, which could not be inverted or in any way disturbed without affecting the efficiency of the whole. On the march, therefore, everything had to be so arranged that when the army formed front again for encampment or battle, every subdivision got exactly into its correct place. Thus, any manœuvres to be executed had to be executed with the whole army; to detach a single portion of it for a flank attack, to form a particular reserve for the attack, with superior forces, of a weak point, would have been impracticable and faulty with such slow troops, fit only to fight in line, and with an order of battle of such stiffness. Then, the advance in battle of such long lines was necessarily executed with considerable slowness, in order to keep up the alignment. Tents followed the army constantly, and were pitched every night; the camp was slightly intrenched. The troops were fed from magazines, the baking establishments accompanying the army as much as possible. In short, the baggage and other train of the army were enormous, and hampered its movements to a degree unknown nowadays. Yet, with all these drawbacks, the military organization of Frederick the Great was by far the best of its day, and was eagerly adopted by all other European governments. The recruiting of the forces was almost everywhere carried on by voluntary enlistments, assisted by kidnapping; and it was only after very severe losses that Frederick had recourse to forced levies from his provinces.—When the war of the coalition against the French republic began, the French army was disorganized by the loss of its officers, and numbered less than 150,000 men. The numbers of the enemy were far superior; new levies became necessary, and were made to an immense extent, in the shape of national volunteers, of which in 1798 there must have been at least 500 battalions in existence. These troops were not drilled, nor was there time to drill them according to the complicated system of line tactics, and to the degree of perfection required by movements in line. Every attempt to meet the enemy in line was followed by a signal defeat, though the French had far superior numbers. A new system of tactics became necessary. The American revolution had shown the advantage to be gained with undisciplined troops from extended order and skirmishing fire. The French adopted it, and supported the skirmishers by deep columns, in which a little disorder was less objectionable so long as the mass remained well together. In this formation they launched their superior numbers against the enemy, and were generally successful. This new formation and the want of experience of their troops led them to fight in broken ground, in villages and woods, where they found shelter from the enemy's fire, and where his line was invariably disordered; their want of tents, field batteries, &c., compelled them to bivouac without shelter, and to live upon what the country afforded them. Thus they gained a mobility unknown to their enemies, who were encumbered with tents and all sorts of baggage. When the revolutionary war had produced in Napoleon the man who reduced this new mode of warfare to a regular system, combined it with what was still useful in the old system, and brought the new method at once to that degree of perfection which Frederick had given to line tactics, then the French were almost invincible, until their opponents had learned from them, and organized their armies upon the new model. The principal features of this new system are: the restoration of the old principle that every citizen is liable in case of need to be called out for the defence of the country, and the consequent formation of the army, by compulsory levies of greater or less extent, from the whole of the inhabitants; a change by which the numerical force of armies was at once raised to threefold the average of Frederick's time, and might in case of need be increased to larger proportions still. Then, the discarding of camp utensils, and of dependence for provisions upon magazines, and the introduction of the bivouac and of the rule that war feeds war, increased the celerity and independence of an army as much as its numerical force was raised by the rule of general liability to serve. In tactical organization, the principle of mixing infantry, cavalry, and artillery in the smaller portions of an army, in corps and divisions, became the rule. Every division thus became a complete army on a reduced scale, fit to act independently, and capable of considerable resistance even against superior numbers. The order of battle was now based upon the column; it served as the reservoir, from which sallied and to which returned the swarms of skirmishers; as the wedge-like compact mass to be launched against a particular point of the enemy's line; as the form to approach the enemy and then to deploy, if the ground and the state of the engagement made it desirable to oppose firing lines to the enemy. The mutual support of the three arms, developed to its full extent by their combination in small bodies, and the combination of the three forms of fighting, skirmishers, line, and column, compose the great tactical superiority of modern armies. Any kind of ground thereby became fit for fighting; and the ability of rapidly judging the advantages and disadvantages of ground, and of at once disposing troops accordingly, became one of the chief requirements of a captain. And not only in the commander-in-chief, but in the subordinate officers, these qualities, and general aptness for independent command, were now a necessity. Corps, divisions, brigades, and detachments were constantly placed in situations where their commanders had to act on their own responsibility; the battlefield no longer presented its long unbroken lines of infantry disposed in a vast plain with cavalry on the wings; but the single corps and divisions, massed in columns, stood hidden behind villages, roads, or hills, separated from each other by seemingly large intervals, while but a small portion of the troops appeared actually engaged in skirmishing and firing artillery until the decisive moment approached. Lines of battle extended with the numbers and with this formation; it was not necessary actually to fill up every interval with a line visible to the enemy, so long as troops were at hand to come up when required. Turning of flanks now became generally a strategical operation, the stronger army placing itself completely between the weaker one and its communications, so that a single defeat could annihilate an army and decide a campaign. The favorite tactical manœuvre was the breaking through the enemy's centre with fresh troops, as soon as the state of affairs showed that his last reserves were engaged. Reserves, which in line tactics would have been out of place and would have detracted from the efficiency of the army in the decisive moment, now became the chief means to decide an action. The order of battle, extending as it did in front, extended also in depth; from the skirmish line to the position of the reserves the depth was very often two miles and more. In short, if the new system required less drill and parade precision, it required far greater rapidity, exertion, and intelligence from every one, from the lowest skirmisher as well as the highest commander; and every fresh improvement made since Napoleon tends in that direction.—The changes in the *matériel* of armies were but trifling during this period; constant wars left little time for improvements the introduction of which requires time. Two very important innovations took place in the French army shortly before the revolution. The first was the adoption of a new model of musket of reduced calibre and windage, and with a curved stock instead of the straight one previously in use. This weapon, more accurately worked, contributed a great deal toward the superiority of the French skirmishers, and remained the model upon which with trifling alterations the muskets in use in all armies up to the introduction of percussion locks were constructed. The second was the simplification and improvement of the artillery by Gribeauval. The French artillery under Louis XV. was completely neglected; the guns were of all sorts of calibres, the carriages old-fashioned, and the models upon which they were constructed not even uniform. Gribeauval, who had served during the seven years' war with the Austrians, and then seen better models, succeeded in reducing the number of calibres, equalizing and improving the models, and greatly simplifying the whole system. It was with his guns and carriages that Napoleon fought his wars. The English artillery, which was in the worst possible state when the war with France broke out, was gradually but slowly much improved; with it originated the stock-trail carriage, which has since been adopted by all continental armies, and the arrangement for mounting the foot artillerymen on the limbers and ammunition wagons. Horse artillery, invented by Frederick the Great, was much cultivated during Napoleon's period, especially by himself, and its proper tactics were first developed. When the war was over, it was found that the British were the most efficient in this arm. Of all large European armies, the Austrian is the only one which supplies the place of horse artillery by batteries in which the men are mounted on wagons provided for the purpose.—The German armies still kept up the special class of infantry armed with rifles, and the new system of fighting in extended order gave a fresh importance to this arm. It was especially cultivated and in 1838 taken up by the French, who felt the want of a long range of musket for Algiers. The *tirailleurs de Vincennes*, afterward *chasseurs à pied*, were formed, and brought to a state of efficiency without parallel. The adoption of this formation was rendered necessary by the great improvements in small arms, and especially in rifles, by which both range and precision were increased to a wonderful degree. The names of Delvigne, Thouvenot, and Minié thereby became celebrated. For the whole infantry, the percussion lock was introduced between 1830 and 1840 in most armies; as usual, the English and the Russians were the last. In the mean time, great efforts were made in various quarters still further to improve small arms, and to produce a musket of superior range which could be given to the whole of the infantry. The Prussians introduced the needle gun, a rifle arm loaded at the breech, and capable of very rapid firing, and having a long range; the invention, originated in Belgium, was considerably improved by them. This gun, although by no means the best of its class either for accuracy or range, simplicity of construction or certainty of action, was early adopted and given to their troops; it was used with great effect in the Schleswig-Holstein war, and more recently in the remarkable campaigns of the Prussians in Bohemia and France. Many military writers have expressed the opinion that the Prussians owe their great successes in their recent wars at least as much to the superiority of their artillery and small arms as to any other single cause. But this is scarcely true; for while they were probably provided with better arms than the Austrians, they were certainly inferior to the French in rifles, it being generally conceded that the *Zündnadelgewehr* or needle gun is a less efficient weapon than the Chassepot. The English were the first to arm the whole of their infantry with a superior musket, viz., the Enfield rifle, a slight alteration of the Minié; its superiority was fully proved in the Crimea, and saved them at Inkerman. But the Americans have surpassed all other nations in the invention and use of rifles and carbines. The rifled musket made in the government shops at Springfield, the Spencer and Henry magazine guns, and the Remington carbine and rifles, as well as many others which were fully tested during the civil war, are now acknowledged to be superior to any English, French, or German arms of the same class, and have been adopted by many European nations.—In tactical arrangements, no changes of importance have taken place for infantry and cavalry, if we except the great improvement of light infantry tactics by the French *chasseurs*, and the new Prussian system of columns of companies, which latter formation, with some variations, is now in general use. The formation in several European armies is nominally three deep, but in practice all nations have adopted the two-rank formation introduced by the English shortly after the time of Napoleon I. As to cavalry, the European nations still adhere to the system of Frederick, with some slight modifications. The Americans during the civil war made great progress in the organization and use of cavalry, or more properly of mounted troops. The first regiments called into service were strictly light cavalry, but the improvements in carbines and revolvers or repeating pistols, combined with the wooded nature of the country in which they were compelled to operate, soon gave a distinctively new character to this arm. Instead of fighting on horseback, using the sabre alone or the sabre and pistol, it became necessary for the cavalry regiments to fight generally on foot; and in this they not only reached a high state of efficiency, but, under Sheridan in the east and Wilson in the west, exerted a powerful influence in bringing the war to an end. The mounted troops operating in Virginia were organized into a separate body from 10,000 to 15,000 strong, called the cavalry corps of the army of the Potomac; while those in Kentucky, Tennessee, Mississippi, and Alabama, amounting to 72 regiments, and reaching at the close of the war 35,000 efficients, were organized into one command, officially known as the cavalry corps of the military division of the Mississippi. These immense masses of mounted troops were strong enough to act independently against the communications and depots of the enemy, or in coöperation with the infantry, upon the flanks and rear of the confederate armies. In the final campaigns in Virginia, and especially at the battle of Winchester or the Opequan, in the destruction of the railroads about Richmond, particularly the South Side road, at the battle of Five Forks, in the pursuit and capture of Lee's army, in the battles of Franklin and Nashville, in the pursuit and dispersion of Hood's army, in the assault and capture of Selma, Columbus, and West Point (Ga.), in the pursuit and capture of Davis and the confederate chieftains, these corps gave proof of their extraordinary merits, not only as cavalry marching rapidly and for long distances, but as infantry fighting steadily and with great dash against infantry and artillery, assaulting and carrying earthworks, and in the performance of the various duties of active warfare. The success of these corps was doubtless greatly influenced partly by their compact and independent organization, and partly by the efficient character of their firearms, which at the end of the war were almost exclusively Spencer carbines or rifles, breechloading magazine guns of unrivalled excellence at that time. It is believed that no well directed attack made by troops using these arms was ever known to fail, whether against cavalry, infantry, or intrenchments. (See CAVALRY.)—In artillery, considerable improvements of detail and simplification of calibres, and of models for wheels, carriages, &c., have taken place in every army. The science of artillery has been greatly improved. All modern armies now use rifled cannon for field service, as well as for siege purposes. Field guns are made of steel and wrought and cast iron, and are of various calibres, all throwing steel or iron balls, bolts, or shells, more or less elongated; these guns are also adapted to the use of canisters of small shot, and have almost entirely replaced the smooth-bored brass guns and howitzers in actual service. The Americans, Prussians, and Belgians have been foremost in making improvements in artillery. (See ARTILLERY.)—The general organization of modern armies is very much alike. With the exception of the British and American, they are recruited by compulsory levy, based either upon conscription, in which case the men, after serving their time, are dismissed for life, or upon the reserve system, in which the time of actual service is short, but the men remain liable to be called out again for a certain time afterward. France is the most striking example of the first, Prussia of the second system. Even in England, where both line and militia are generally recruited by voluntary enlistment, the conscription (or ballot) is by law established for the militia should volunteers be wanting. In Switzerland, no standing army exists; the whole force consists of militia drilled for a short time only. The enlistment of foreign mercenaries is still the rule in some countries; the French still have their foreign legion; and England, in case of serious war, is regularly compelled to resort to this expedient. The time of actual service varies very much: from a couple of weeks with the Swiss, 18 months to 2 years with the smaller German states, and 3 years with the Prussians, to 5 or 6 years in France, 12 years in England, and 15 years in Russia. The officers are recruited in various ways. In most armies there are now no legal impediments to advancement from the ranks, but the practical impediments widely vary. In France and Austria a portion of the officers must be taken from the sergeants; in Russia the insufficient number of educated candidates makes this a necessity. In Prussia the examination for officers' commissions in peace is a bar to uneducated men; in England advancement from the ranks is a rare exception. For the remainder of the officers there are in most countries military schools, though, with the exception of France, it is not necessary to pass through them. In military and general education the Prussian officers are ahead; the English and the Russians stand lowest in both. With the exceptions named above, the equipment and armament of modern armies are now everywhere nearly the same. There is, of course, a great difference in the quality and workmanship of the material. In this respect the Russians stand lowest, and the English and Americans, where the industrial advantages at their command are really made use of, stand highest. The infantry of all armies is divided into line and light infantry. The first is the rule, and composes the mass of all infantry; real light infantry has become much more popular since the American civil war, and the late wars between Prussia, Austria, and France, and the tendency in all armies is to the numerical increase of this force. Cavalry is divided into heavy and light everywhere except in America, where it is all light. Cuirassiers are always heavy; hussars and chasseurs, always light horse. Dragoons and lancers are in some armies light, in others heavy cavalry; and the Russians would also be without light cavalry were it not for the Cossacks. The best light cavalry in Europe is undoubtedly that of the Austrians, the national Hungarian hussars, and Polish uhlans. The same division holds good with reference to artillery. Light artillery is still subdivided into horse and foot, the first especially intended to act in company with cavalry. The Austrians have no horse artillery; the English and French have no proper foot artillery, 'the men being carried on the limbers and ammunition wagons.—The infantry is formed into companies, battalions, and regiments. The battalion is the tactical unit; it is the form in which the troops fight, save in a few exceptional cases. A battalion must not be too strong to be commanded by the voice and eye of its chief, nor too weak to act as an independent body in battle, even after the losses of a campaign. The strength, therefore, varies from 600 to 1,400 men; 800 to 1,000 forms the average. The division of a battalion into companies has for its object the fixing of its evolutionary subdivisions, the efficiency of the men in the details of the drill, and the more commodious economical administration. The number of companies in a battalion varies as much as their strength. The English have ten of from 90 to 120 men, the Russians and Prussians four of 250 men, the French and Austrians six of varying strength. Battalions are formed into regiments, more for administrative and disciplinary purposes and to insure uniformity of drill, than for any tactical object; in formations for war, therefore, the battalions of one regiment are often separated. In Russia and Austria there are four, in Prussia three, in France two service battalions, besides depots, to every regiment; in England, most regiments are formed, in peace, of but one battalion. Cavalry is divided into squadrons and regiments. The squadron, from 100 to 200 men, forms the tactical and administrative unit; the English alone subdivide the squadron, for administrative purposes, into two troops. There are from three to ten service squadrons to a regiment; the British have in peace but three squadrons, of about 120 horse; the Prussians four, of 150 horse; the French five, of 180 to 200 horse; the Austrians six or eight, of 200 horse; the Russians six to ten, of 150 to 170 horse. With cavalry the regiment is a body of tactical significance, as a regiment offers the means to make an independent charge, the squadrons mutually supporting each other, and is for this purpose formed of sufficient strength, viz., between 500 and 1,600 horse. The British alone have such weak regiments that they are obliged to put four or five of them to one brigade; on the other hand, the Austrian and Russian regiments in many cases are as strong as an average brigade. The French have nominally very strong regiments, but have hitherto appeared in the field in considerably reduced numbers, owing to their poverty in horses. Artillery is formed in batteries; the formation in regiments or brigades in this arm is only for peace purposes, except in America, where it is used exclusively during war. Four guns is the least number in a battery; the Austrians have eight, and the French, Prussians, English, and Americans six guns for each battery. Riflemen or other real light infantry are generally organized in battalions and companies only, not in regiments; the nature of the arm forbids its union in large masses. The same is the case with sappers and miners, they being besides but a very small portion of the army. The French alone make an exception in this latter case. ,With the regiment the formation of most armies in time of peace is generally considered complete. The larger bodies, brigades, divisions, and army corps, are mostly formed when war breaks out. The Russians and Prussians alone have their army fully organized and the higher commands filled up, as if for actual war.—In war, several battalions or squadrons are formed into a brigade, consisting of from four to eight battalions for infantry, or from six to twenty squadrons for cavalry. With large cavalry regiments these latter may very well stand in lieu of brigade; but they are very generally reduced to smaller strength by the detachments they have to send to the divisions. Light and line infantry may with advantage be mixed in a brigade, but not light and heavy cavalry. The Austrians very generally add a battery to each brigade. A combination of brigades forms the division. In most armies it is composed of all the three arms, say two brigades of infantry, four to six squadrons, and one to three batteries. The French and Russians have no cavalry to their divisions; the English form them of infantry exclusively. Unless, therefore, these nations wish to fight at a disadvantage, they are obliged to attach cavalry and artillery respectively to the divisions whenever the case occurs, which is easily overlooked or often inconvenient or impossible. The proportion of divisionary cavalry, however, is everywhere but small, and therefore the remainder of this arm is formed into cavalry divisions of two brigades each, for the purpose of reserve cavalry. Two or three divisions, sometimes four, are for larger armies formed into an army corps. Such a corps has everywhere its own cavalry and artillery, even where the divisions have none; and where these latter are mixed bodies, there is still a reserve of cavalry and artillery placed at the disposal of the commander of the corps. It has been found best in the United States to separate the cavalry from the infantry entirely, and form it into separate corps under separate commanders. Napoleon was the first to attach cavalry to his other corps, and, not satisfied therewith, he organized the whole of the remaining cavalry into reserve cavalry corps of two or five divisions of cavalry with horse artillery attached. The Russians have retained this formation of their reserve cavalry, and the other armies are likely to take it up again in a war of importance, though the effect obtained has never yet been in proportion to the immense mass of horsemen thus concentrated on one point, except in America, as heretofore stated.—Such is the modern organization of the fighting part of an army. But, in spite of the abolition of tents, magazines, field bakeries, and bread wagons, there is still a large train of non-combatants and of vehicles necessary to insure the efficiency of the army in a campaign. To enable the commanders of armies, army corps, and divisions to conduct, each in his sphere, the troops intrusted to them, a separate corps is formed in every army except the British, composed of officers exclusively, and called the staff. The functions of these officers are to reconnoitre and sketch the ground on which the army moves or may move; to assist in making out plans for operations, and to arrange them in detail, so that no time is lost, no confusion arises, no useless fatigue is incurred by the troops. They are therefore in highly important positions, and ought to have a thoroughly finished military education, with a full knowledge of the capabilities of each arm on the march and in battle. They are taken in all countries from the most able subjects, and carefully trained in the highest military schools. The English alone imagine that any subaltern or field officer selected from the army at large is fit for such a position, and the consequence is that their staffs are inferior, and the army is incapable of any but the slowest and simplest manœuvres; while the commander, if at all conscientious, has to do all the staff work himself. A division can seldom have more than one staff officer attached; an army corps has a staff of its own under the direction of a superior or a staff officer; and an army has a full staff, with several generals, under a chief, who in urgent cases gives his orders in the name of the commander. The chief of the staff in the British army has an adjutant general and a quartermaster general under his orders; in other armies the adjutant general is at the same time chief of the staff; in France the chief of the staff unites both capacities in himself, and has a different department for each under his orders. The adjutant general is the chief of the *personnel* of the army, receives the reports of all subordinate departments and bodies of the army, and arranges all matters relative to discipline, instruction, formation, equipment, armament, &c. All subordinates correspond through him with the commander-in-chief. If chief of the staff at the same time, he coöperates with the commander in the formation and working out of plans of operation and movements for the army. The proper arrangement of these in European armies is left to the quartermaster general; the details of marches, cantonments, and encampments are prepared by him. A sufficient number of staff officers are attached to headquarters for reconnoitring the ground, preparing projects as to the defence or attack of positions, &c. There are also a commander-in-chief of the artillery and a superior engineer officer for their respective departments, a few deputies to represent the chief of the staff on particular points of the battlefield, and a number of orderly officers and orderlies to carry orders and despatches. To the headquarters are further attached the chief of the commissariat with his clerks, the paymaster of the army, the chief of the medical department, and the judge advocate or director of the department of military justice. The staffs of the army corps and divisions are regulated on the same model, but with greater simplicity and a reduced *personnel;* the staffs of brigades and regiments are still less numerous, and the staff of a battalion may consist merely of the commander, his adjutant, an officer as paymaster, a sergeant as clerk, and a drummer or bugleman.—To regulate and keep up the military force of a great nation, numerous establishments besides those hitherto named are required. There are recruiting and remounting commissioners, the latter often connected with the administration of national establishments for the breeding of horses, military schools for officers and non-commissioned officers, model battalions, squadrons, and batteries, normal riding schools, and schools for veterinary surgeons. There are in most countries national founderies and manufactories for small arms and gunpowder; there are the various barracks, arsenals, stores, the fortresses with their equipments, and the staff of officers commanding them; finally, there are the commissariat and general staff of the army, which, for the whole of the armed force, are even more numerous and have more extensive duties to perform than the staff and commissariat of a single active army. The staff especially has very important duties. It is generally divided into a historical section (collecting materials relative to the history of war, the formation of armies, &c., past and present), a topographical section (intrusted with the collection of maps and the trigonometrical survey of the whole country), a statistical section, &c. At the head of all these establishments, as well as of the army, stands the ministry of war, organized differently in different countries, but comprising, as must appear from the preceding observations, an immense variety of subjects. Such is the vast machinery devoted to recruiting, remounting, feeding, directing, and always reproducing a modern first-class army. The masses brought together correspond to such an organization. Napoleon's grand army of 1812, when he had 200,000 men in Spain, 200,000 in France, Italy, Germany, and Poland, and invaded Russia with 450,000 men and 1,300 guns, was equalled in 1870, when Prussia put almost her entire armed force in the field against France, under the immediate command of King William, assisted by Gen. Von Moltke and an able assemblage of army and corps commanders. This remarkable campaign, although it was characterized by no extraordinary loss of life either to the French or the Prussians, resulted in the capture or annihilation of the entire French army and the complete prostration of the French empire. The Prussian army engaged in the campaign earned for itself the reputation of being the most perfect, all things considered, in the world. Its artillery and infantry are specially good, but its cavalry seems to be behind the age.—The military system of the United States is based upon volunteer armies raised as occasion demands. During the civil war, from first to last, 2,690,401 men (including reënlistments) were enrolled, equipped, and organized into armies. The principal of these were the army of the Potomac, the army of the Tennessee, the army of the Cumberland, and the army of the Ohio; the last three were finally united into one command, known as the military division of the Mississippi. The troops constituting these armies were raised by the various loyal states, by regiments, under proclamation and demand from the president of the United States, the numbers being apportioned by the secretary of war, through the provost marshal general, according to the population of the respective states. As soon as the various regiments were mustered into the service of the United States, they were under the complete control of the general government, and were afterward assigned to brigades, divisions, corps, and armies, according to the requirements of the service, and generally without regard to the states from which they came. They received their pay, arms, clothing, and subsistence from the United States, though, with a few exceptions, as in the case of the colored troops, the field and line officers received their commissions and promotions from the governors of their respective states. All general and general staff officers were commissioned by the president, and no officer after having been mustered into the service of the United States could be dismissed by the state authorities. The requisitions upon the various states were generally filled with a reasonable degree of promptitude, although, owing to the great expansion of the currency due to the emission of paper money and the great stimulation of the various industries of the country engaged in the production of army supplies, the rates of wages advanced so rapidly that before the war ended it became exceedingly difficult to raise volunteers, except by the payment of bounties amounting in many instances to $1,500 per man. The use of this system resulted in the success of the national arms, but at an extravagant cost in men, material, and money. Immediately after the termination of the war the volunteer army, amounting to about 1,100,000 men, was quietly and rapidly disbanded, the various regiments returning to their respective states, and becoming at once absorbed in the body of the people, without the slightest disturbance of the peace and order of society, or derangement of its industries. The regular army, which during the war had been increased from about 18,000 men to something over 50,000, was reduced by successive steps to 30,000 men. This force is mainly used for garrisoning the permanent fortifications, and for preserving order among the Indian tribes of the west.

ARMY WORM. See supplement.

ARNAULD, a French family, several members of which are noted in connection with the convent of Port Royal and the Jansenist controversy. **I. Antoine,** born in Paris in 1560, died there, Dec. 29, 1619. He was an advocate, and gained celebrity by an argument in 1594 against the Jesuits, and in favor of the university of Paris. He was the author of *Avis au roi Louis XIII. pour bien régner*, and of various other writings. He was a Roman Catholic, although denounced by the Jesuits as a Huguenot. He was the father of 20 children, ten of whom died young, and the others, four sons and six daughters, became connected with the Port Royal convent. **II. Robert Arnauld d'Andilly,** eldest son of the preceding, born in Paris about 1588, died at Port Royal, Sept. 27, 1674. He was originally an advocate, and like his father distinguished himself by a plea for the university of Paris and against the Jesuits. At the age of 55 he retired to a farm adjoining the convent of Port Royal, where he passed the remainder of his life in seclusion, devoting his time to theological subjects, and writing and translating. Among his works are translations of the "Confessions" of Augustine and of Josephus's "History of the Jews," memoirs of his own life, *La vie de Jésus* (a poem), and *Vies des saints pères du désert et de quelques saintes* (3 vols. 8vo), which he considered his best work. **III. Henri,** bishop of Angers, brother of the preceding, born in Paris in 1597, died at Angers about 1692. He was destined for the bar, but on receiving from the crown the gift of the abbey of St. Nicholas, entered the church. He was elected bishop of Toul by the diocesan chapter, but, some question arising, he refused to accept the position. In 1645 he went to Rome to appease the quarrel between the Barberini family and Pope Innocent X.; in this he was so successful that a medal was struck and a statue erected in his honor. Returning to France, he was in 1649 made bishop of Angers. He became a zealous Jansenist, and was one of the four bishops who refused to sign the acceptance of the papal bull condemning the *Augustinus* of Jansenius. He was accustomed to take only five hours' sleep, that he might gain time for prayer and reading the

Scriptures. He left his diocese only on one occasion, and that was to reconcile the prince of Tarento to his father, the duke de la Trémouille. In 1652 Angers revolted, and the queen mother was about to take heavy vengeance, but was prevented by Arnauld, who in administering the sacrament said to her, "Take the body of Him who forgave his enemies when on the cross." He was urged to take one day in the week for recreation; but replied, "I will do so when you find me a day when I am not a bishop." His *Négociations à la cour de Rome* (5 vols., 1748) contain many curious facts and anecdotes. **IV. Antoine,** called "the great Arnauld," youngest son of Antoine, and brother of the two preceding, born in Paris, Feb. 6, 1612, died near Liége, Aug. 8, 1694. He studied for the law, but was induced to turn his attention to theology. In 1641 he became a priest, and was made doctor of the Sorbonne. In 1643 he was made associate of the Sorbonne. In this year he published his famous work *De la fréquente communion*, which was sharply attacked by the Jesuits. Arnauld replied in his *Théologie morale des Jésuites*, which was the beginning of a long and fierce controversy. His opponents endeavored to have him summoned to Rome, to avoid which he retired to the convent of Port Royal des Champs, near Paris. Soon afterward he became involved in the disputes concerning Jansenius and his *Augustinus*, several propositions in which had been (Aug. 1, 1641) condemned by Pope Urban VIII. Arnauld undertook to defend the work of Jansenius against the papal bull. Besides strictly controversial works, he wrote at this period *Mœurs de l'église catholique; La correction; La grâce; La vérité de la religion; De la foi, de l'espérance et de la charité;* and the *Manuel de Saint Augustin;* and translated his *Fréquente communion* into Latin. He also undertook the spiritual direction of the nuns in the convent of Port Royal, of which his sister Marie Jacqueline was abbess. In connection with Pascal, Nicole, and others, he prepared several elementary works on education. "The Port Royal Grammars" held their place as text books for a long time. In 1649 the Jansenist controversy broke out afresh, and the *Augustinus* was again condemned by the pope. In 1655 or 1656 Arnauld found it necessary to leave Port Royal and seek a secret place of refuge; he was at this time expelled from the Sorbonne, and from the faculty of theology, 72 doctors and many licentiates going out with him. For Pascal's famous "Provincial Letters," against the Jesuits, Arnauld furnished the materials, the wit and satire being Pascal's. In 1658 Arnauld entered personally into the contest, in his *Cinque écrits en faveur des curés de Paris contre les casuistes relâchés*, which was followed in 1662 by *La nouvelle hérésie*, and in 1669 by the first volume of his *Morale pratique*, the last volume of which was not published until the year of his death. All these works were directed against the Jesuits. The peace of Clement IX. (1668) for a time allayed the Jansenist controversy. Arnauld contributed to this by an eloquent memorial to the pontiff. He was presented to the papal nuncio, and to Louis XIV., who received him graciously, and urged him to "employ his golden pen in defence of religion." Arnauld, in conjunction with Nicole, wrote a work *De la perpétuité de la foi de l'église catholique*, which was dedicated to the pope. This work gave rise to a controversy between Arnauld and the reformed minister Claude. The bishop of Paris procured from Louis XIV. an order for the arrest of Arnauld, who concealed himself for a time in the house of the duchess de Longueville; but in 1679 he went to Brussels, where he was assured of protection. Here in 1681 he published his *Apologie pour les Catholiques*, a defence of his old antagonists the Jesuits against the absurd charges brought forward in England by Titus Oates. In 1689 appeared an anonymous work, afterward shown to be written by Arnauld, directed against the prince of Orange, William III. of England, in which that statesman was designated as "a new Absalom, a new Herod, and a new Cromwell." In opposition to the views of his old friend Malebranche, Arnauld wrote in 1683 his *Traité des vraies et des fausses idées*, and in 1685 his *Réflexions philosophiques et théologiques sur le nouveau système de la nature et de la grâce du père Malebranche.* He continued to the last, even when more than 80 years old, to carry on his controversies with Malebranche, with the Calvinists, and with Bayle and other skeptical philosophers. His last work, *Réflexions sur l'éloquence des prédicateurs*, appeared in 1694. His writings, as named by Moréri, comprise 320 works; and as originally published they appeared in 100 volumes. They were collected and published at Lausanne and Paris in 45 vols. 4to (1775–'83). **V. Marie Jacqueline Angélique,** abbess of Port Royal, sister of the preceding, born in 1591, died Aug. 6, 1661. At the age of 14 she was made abbess of Port Royal des Champs. At 17 she was directed by the general of the order of St. Bernard to reform the abbey of Maubuisson, where she subjected herself to all the privations imposed upon the sisterhood. She became convinced that her election as abbess of Port Royal was invalid, and resigned, after having secured a provision that thereafter the abbesses should be chosen triennially. Some years afterward the pope chose her to establish a new convent which the duchess de Longueville was about to found in honor of the holy sacrament. This establishment not continuing, Marie Jacqueline returned to the convent of Port Royal, and was again elected abbess, a position which she retained for 12 years. Racine, in his *Histoire de Port Royal*, attributes to her the authorship of the history of the persecution suffered by the nuns, which was published at Paris in 1724. **VI. Agnès,** sister of the preceding, born in 1594, died

Feb. 19, 1671. She entered the convent when a mere child, and at the age of 15 was appointed mistress of the novices. She was at the head of the establishment during the five years which her sister passed at Maubuisson; then became her coadjutor, and was subsequently chosen abbess, and for 27 years governed Port Royal, alternately with her sister, whom she survived nine years. She was the author of two books, *Le chaplet secret du Saint Sacrament* (1663), which was suppressed at Rome, but without being formally censured, and *L'image de la religieuse parfaite et imparfaite* (1665). The *Constitutions de Port Royal* are also attributed to her. These abbesses were two of six sisters, all belonging to one convent, and all attached to the Jansenist party. The archbishop of Paris said that they were "as pure as angels, but as proud as devils." **VII. Angélique,** usually designated by her conventual name Mère Angélique de St. Jean, born in Paris, Nov. 24, 1624, died there, Jan. 29, 1684. She was the daughter of Robert Arnauld d'Andilly, and niece of the four preceding. She was educated in the convent of Port Royal by her aunt Marie Jacqueline. When not quite 20 years old she became a nun, and nine years afterward was chosen sub-prioress of the convent. When the establishment was removed to Port Royal de Paris she retained the same position. A royal order having been issued for breaking up the institution, the inmates were arrested by the police, and dispersed through various convents, every endeavor being made to induce them to accede to the formulary of Pope Alexander VI. From these solicitations Angélique was especially excepted, because her "known obstinacy" made it sure that she would not agree. At length the nuns were restored to Port Royal des Champs, but were for years subjected to the surveillance of the police, no intercourse being permitted between them and persons outside of the convent. In 1669 the Port Royal society was reconstituted, Angélique being again elected prioress. In 1688 she was chosen abbess. But the next year her powerful protector, the duchess de Longueville, died, and the persecution was renewed, it being expressly ordered that no new novices should be admitted. Angélique exerted herself to stem the storm; she consoled the nuns, and put forth all her influence with persons in power. Her efforts were unavailing, and she sank under a complication of griefs. She was learned, pious, and gentle. She wrote several books, the most valuable of which is *Mémoires pour servir à l'histoire de Port Royal, et à la vie de la révérende Mère Marie Angélique de Sainte Madeleine Arnauld, réformatrice de ce monastère* (3 vols., Utrecht, 1742). She also took a considerable part in the preparation of the *Nécrologie de Port Royal des Champs* (Amsterdam, 1723), and wrote other works in defence of the convent.

ARNAULT, Vincent Antoine, a French author, born in Paris in January, 1766, died near Havre, Sept. 16, 1834. He became first known to fame by two tragedies, *Marius à Minturnes* and *Lucrèce*. After the massacres of September, 1792, he went to London and Brussels, and on his return in 1793 was arrested, but soon set free. In 1797 Bonaparte sent him on a mission to the Ionian Islands. In 1799 he produced in Paris a tragedy, *Les Vénitiens*, suggested by his residence at Venice, which was very favorably received by Napoleon himself, before whom he delivered several lectures on that city. He became in the same year member of the French academy, in 1805 vice president and in 1808 principal secretary of the council of the university. All these offices were taken from him after the emperor's downfall, but restored to him during the hundred days. Besides his tragedies he wrote a number of miscellaneous prose works and poems, a collection of fables, and *Vie politique et militaire de Napoléon* (3 vols. fol., Paris, 1822), and prepared with Jay, Jouy, and De Norvins the *Nouvelle biographie des contemporains* (20 vols. 8vo, 1820–'25).

ARNAUTS. See ALBANIA.

ARND, or Arndt, Johann, a German theologian, born at Ballenstedt, Anhalt, Dec. 27, 1555, died at Celle, May 11, 1621. He was pastor successively at Paderborn and Quedlinburg, and in 1599 was appointed preacher to the court at Brunswick. In 1611 he was presented by the duke of Lüneburg to the church at Celle, and he soon afterward became superintendent of all the churches of the duchy, which office he held till his death. His writings are marked by great fervor of devotion. His principal work, on "True Christianity," which has been translated into almost all European languages, approaches so near to mysticism that it was attacked during the lifetime of its author as a dangerous and heretical production. The fact that he gave liberally to the poor, while himself in poverty, gave rise to a belief that he had discovered the secret of making gold.

ARNDT, Ernst Moritz, a German patriot, professor of history at the university of Bonn, born at Schoritz, on the island of Rügen, Dec. 26, 1769, died in Bonn, Jan. 29, 1860. He studied at Greifswald and Jena, and after travelling over Europe was appointed professor at Greifswald, where he soon published his "History of Serfdom in Pomerania and Rügen," which roused the wrath of some members of the Pomeranian nobility. In 1807 appeared the first volume of his *Geist der Zeit*, containing his attack against Napoleon, for which he was expelled from the country. He then went to Stockholm, where, under a feigned name, he supported himself by teaching languages. In 1810 he ventured to return to Greifswald in disguise, but on hearing of the Russian campaign, he proceeded in 1812 to St. Petersburg, and published pamphlet after pamphlet to rouse the public mind of Europe from its lethargy. His cry was, If Napoleon is successful in Russia, Germany is undone. Baron Stein sympathized and acted with him. At this time he wrote his book defining the Rhine as a German river, and also his stirring national songs, including *Was ist des Deutschen Vaterland?* In 1818 he became professor of modern history at Bonn, but his liberal ideas soon gave renewed offence at Potsdam. He was tried for treason, and though no verdict could be found against him, it was 20 years before the king would allow him to teach history again. In 1848 he was sent as deputy to the Frankfort parliament; but on May 21, 1849, he withdrew from parliament with the whole constitutional party, which was in favor of a hereditary empire. He returned to Bonn, where, constantly employed in literary labor, he passed an active and happy old age, known and honored throughout Germany, under the popular name of "Father Arndt," as one of the foremost liberators of the country from foreign tyranny and home abuses. A monument in his honor was placed on a plateau near Bonn, July 29, 1865. His residence and garden have been purchased and presented to the city of Bonn.

ARNE, Thomas Augustine, an English composer of music, born in London in 1710, died March 5, 1778. His father, an upholsterer, gave him a good education at Eton, and bound him apprentice to an attorney, but afterward consented to his following his inclination and devoting himself exclusively to musical composition. In 1733 he set to music Addison's "Rosamond" and Fielding's "Tom Thumb," under the name of the "Opera of Operas," both of which were received with much favor. The former was composed chiefly for his sister, afterward the celebrated Mrs. Cibber. In 1738 he wrote the music to Milton's "Comus," which firmly established his reputation as a composer. During the next 20 years he wrote operas for Drury Lane theatre, oratorios, and a vast number of songs. In 1762 his most famous work, "Artaxerxes," an opera after the Italian style, was produced, and for many years held a prominent place on the lyric stage. His other most successful works were the "Judgment of Paris," "Eliza," "Britannia," a musical farce entitled "Thomas and Sally," "The Fairies," and "The Stratford Jubilee." His oratorios, owing to the competition of Handel's works, were comparative failures. As a composer of songs Dr. Arne was unsurpassed by any English writer since the time of Purcell; and many of them, such as "Rule Britannia," and "The Soldier Tired," are still popular. In 1769 he received from Oxford the degree of doctor in music.

ARNHEM, or **Arnheim** (anc. *Arenacum*), a city of Holland, capital of the province of Gelderland, on the right bank of the Rhine, 30 m. E. by S. of Utrecht; pop. in 1871, 33,181, half Roman Catholics, and the rest mostly Protestants. It was once a strong fortress, but the ramparts have been converted into promenades, and the fine situation has made the adjoining pleasure grounds and villages favorite resorts of distinguished and opulent persons, including many retired East India merchants. The town hall is called the Devil's House, from the peculiar adornments of its front. In the church of St. Eusebius (the *Groote Kerk*) are the tombs of the dukes and counts of Gelderland and a fine mausoleum of one of the former, Charles of Egmont. The pulpit of the St. Walburg Roman Catholic church was designed by Cuypers. There are many other interesting public buildings, including the Bronbeek, a hospital for East India invalid soldiers, various educational and literary institutions, and a renowned music hall (*Musis sacrum*). The trade, much increased by railway communications, consists in the export of cereals and tobacco, and in a large commission business with Germany. Carriages, mirrors, turnery, and mathematical and other instruments are manufactured. In the middle ages it was called Arnoldi Villa. Sir Philip Sidney died here in 1586. In 1813 it was stormed by the Prussians.

ARNICA, a genus of plants of the natural order *compositæ*. The *arnica montana* or leopard's bane grows in the mountainous districts of the north and middle of Europe, blossoming in June and July. Its flowers, leaves, and root are employed in medicine, but the flowers are usually preferred. A tincture and extract are prepared from the flowers, and a tincture from the root. An infusion may be used. Arnica contains a volatile oil, bitter extractive, and resin, the first being probably the active constituent. When taken internally arnica produces increased rapidity of the pulse, headache, dizziness, and spasmodic twitchings of the muscles, with occasional vomiting and diarrhœa. Externally it is a slight irritant. It has been used, more in Germany than in this country, in low forms of fever and nervous diseases. It is largely used as a remedy for sprains and bruises.

Arnica montana.

ARNIM, or **Arnheim, Johann Georg,** a German soldier, born at Boitzenburg in 1581, died in Dresden, April 18, 1641. He fought under Gustavus Adolphus against Russia, and in the Polish service against the Turks, and was a favorite officer of Wallenstein, who made him field marshal. In 1631 he joined the elector of Saxony, commanded the Saxon troops at Breitenfeld, invaded Bohemia, took Prague, and was victorious at Nimburg, in 1632 returned to Saxony, then fought in Brandenburg and Silesia, and in 1634 defeated the imperialists at Liegnitz. In the following year he left the service, and in 1637 was arrested by the Swedes on account of an alleged former secret understanding with Wallenstein. In November, 1638, he escaped from Stockholm to Hamburg, and raised at his own expense and with the consent of the imperial and Saxon authorities an army of 16,000 men against Sweden.

ARNIM, Henry von. See supplement.

ARNIM, Karl Otto Ludwig von, a German author, born in Berlin, Aug. 1, 1779, died there, Feb. 9, 1861. His books of travel in France, Italy, Spain, Russia, and the East (Berlin, 6 vols., 1838–'50) are much valued.

ARNIM. I. Ludwig Achim (Joachim) von, a German poet, one of the leaders of the "romantic school" in German literature, born in Berlin, Jan. 26, 1781, died at his estate Wiepersdorf, near Dahme, Jan. 21, 1831. He devoted himself in his youth to scientific studies, but even in these his researches were of a fantastic nature, and showed the tendency of his mind, which soon exhibited much of its singular originality in the earliest of his literary works, *Ariel's Offenbarungen* (Göttingen, 1804). Soon after the publication of this book he travelled in Germany, studying the habits of the common people, and tracing to their sources the current folk songs and legends. Of the almost forgotten beauties found among these popular ballads and tales he made excellent use in several of his works which appeared soon after—the principal portions of *Des Knaben Wunderhorn* (3 vols., Heidelberg, 1806–'8; 2d ed., 1819); *Wintergarten, eine Sammlung von Novellen* (Berlin, 1809); *Armuth, Reichthum, Schuld und Busse der Gräfin Dolores* (2 vols., Berlin, 1810); *Halle und Jerusalem, Studentenspiel und Pilgerabenteuer* (Heidelberg, 1811); and the *Schaubühne* (Berlin, 1813). In 1811 he married Elisabeth Brentano, afterward celebrated as Bettina von Arnim. During the years of Napoleon's rule in Germany, Von Arnim was among the patriots who strove most energetically to arouse his countrymen against the conqueror's despotism. The years of the war brought financial trouble upon him, and he wrote but little for a considerable time. That difficulty over, he again appeared in literature and published several works, of which *Die Kronenwächter, oder Berthold's erstes und zweites Leben,* was the chief. His complete works were published by Grimm, in 19 volumes (Berlin, 1839–'46). **II. Elisabeth von,** best known as Bettina, wife of the preceding, and sister of the poet Clemens Brentano, born in Frankfort-on-the-Main, April 4, 1785, died in Berlin, Jan. 20, 1859. Her education was little guided by her friends, and its entire freedom from conventional rules probably exaggerated the eccentricities which she began at an early age to display. A part of her youth was spent in a convent, a part in Offenbach and Marburg, but Frankfort was her favorite home. She formed a friendship with a canoness, Fräulein Günderode, who exerted over her naturally fantastic habits of thought a most unhealthy influence; the two friends acknowledged only a singularly fanciful worship of nature, and natural impulses, laws, and methods of life; a dreamy brooding over this and the "tyranny" of conventionalities soon grew into almost a mental disease. Fräulein Günderode committed suicide on account of an unhappy passion for the philologist Creuzer, and this event still further affected Bettina's morbid current of thought. Soon after her friend's death she entered into correspondence with Goethe, for whom she contracted a fantastic love. The poet, now nearly 60 years of age, treated this as a child's whim, and, without encouraging, still did not repel it, though he in no way returned her feeling. The outgrowth of their singular correspondence was Bettina von Arnim's book *Goethe's Briefwechsel mit einem Kinde* (3 vols., Berlin, 1835), a record since proved to be so full of falsifications, distortions, and affectations as to be worth little save as a record of its author's egotism and eccentricity. (See Lewes's "Life of Goethe.") She herself translated the work into English. After her marriage to Achim von Arnim in 1811, she lived in Berlin, where her mind took a healthier tone from her active charity and from the absence of her former surroundings. In 1840 portions of her correspondence with her old friend the canoness were published under the title *Die Günderode* (partly translated into English by Margaret Fuller). Her house was a well known rendezvous of the most famous literary characters of the day, among whom she was known only as "Bettina" even in her old age. Her noteworthy works besides those mentioned above were: *Dies Buch gehört dem Könige* (2 vols., Berlin, 1843); *Ilius Pamphilius und die Ambrosia* (2 vols., 1848); *Gespräche mit Dämonen* (1852). In analyzing Bettina's character, it is difficult to determine how much of her eccentricity is attributable to her actual peculiarities, and how much to a morbid egotism and affectation, largely influenced by the opinions of the unsettled and disorganized time in which she lived. **III. Gisela von,** daughter of the preceding, and wife of Hermann Grimm, has become known as a writer by her *Dramatische Werke,* published two years before her mother's death (2 vols., Bonn, 1857).

ARNO, a river of Tuscany, rises on the S. slope of Monte Falterona in the Apennines, 6 m. N. of Prato Vecchio, flows S. to the neighborhood of Arezzo, where it is joined by the Chianassa and the Chiana, thence N. W. to Pontassieve, where it receives the Sieve, thence follows a westerly course through Florence and Pisa to 7 m. below the latter city, where it flows into the Mediterranean through a channel cut for it in 1603; length 150 m. It is navigable for small vessels from the sea to Florence, but further is liable to be obstructed by floods and droughts. To guard against the former, it has been embanked for the greater part of its course. The valley through which the Arno flows between Florence and Pisa is the very garden of Italy, and is famous for its beauty.

ARNOBIUS, an African rhetorician, born in Sicca Veneria (supposed to be the Tunisian Keff), on the eastern border of Numidia, flourished at the beginning of the 4th century. He was a violent opponent of Christianity, which had been introduced into Numidia as early as 250, until, tradition says, he was warned in a dream to embrace the new religion. There is, however, reason to ascribe his conversion to a rational investigation of the gospels. On his conversion he applied to the bishop of Sicca for admission to the church. The bishop desired some proof of the sincerity of a man who had been so zealous a defender of paganism. Arnobius therefore wrote the famous treatise entitled *Adversus Gentes*, in which he gives proof of his zeal for Christianity by exposing the fallacies of his former faith. The *Adversus Gentes* inclines to Gnosticism and Dualism, in the conclusion that, since the Supreme Being would not have created so imperfect a work as the human soul, it must have been created by some inferior being in his image. Arnobius taught that immortality was not an attribute of the soul, but could only be acquired by effort to conquer evil and rise to the supremacy of good.

ARNOLD, Benedict, an officer in the American revolutionary army, born in Norwich, Conn., Jan. 3, 1740, died in London, June 14, 1801. He was trained to mercantile pursuits, but, being of a restless and reckless disposition, was invariably unsuccessful in trade. He showed, however, considerable aptitude for military life, and at the outbreak of the American revolution was the captain of a company of Connecticut militia known as the "governor's guards." At the head of this command he repaired to Cambridge, Mass., after the battle of Lexington, and was commissioned a colonel. He coöperated with Ethan Allen in the capture of Forts Ticonderoga and Crown Point on Lake Champlain, and in the latter part of 1775 was appointed, in connection with Gen. Richard Montgomery, to the command of an expedition against Canada, whence with Montgomery he made (Dec. 31) a gallant but unsuccessful assault upon Quebec, receiving a severe wound in the leg. For these services he was rewarded by congress with the commission of a brigadier general. He remained on the northern frontier during the ensuing spring and summer, and, having organized a flotilla on Lake Champlain, fought a desperate battle on Oct. 11, 1776, with a greatly superior British force, in which he was worsted. On the succeeding day he ran his vessels on shore and fired them, and then retired unmolested to Ticonderoga. Notwithstanding these exploits, he was omitted from the list of five major generals who soon after were appointed by congress. A letter from Washington soothed his wounded vanity, but there is little doubt that the injustice of congress in this instance first suggested to his mind the idea of betraying his country. Receiving permission to visit Philadelphia, where congress was then sitting, he took part near Danbury, Conn., in an encounter with a superior body of British troops, and again distinguished himself by coolness and audacity in the presence of extreme danger. Congress finally commissioned him a major general, but still left him below the five others recently appointed, which only intensified his feelings of resentment. In the summer of 1777 he joined the northern army under Gates, and by a brilliant movement relieved Fort Stanwix, on the Mohawk, besieged by a large force of British and Indians. He was prevented by the jealousy of Gates from taking an active part in the first battle of Bemus Heights, but in the second battle, Oct. 7, he entered the field without permission, led the last desperate charge against the Hessian encampment, and was severely wounded in the leg as he rode into the sallyport. Having partially recovered from his wound, he was appointed in June, 1778, to the command of Philadelphia, then recently evacuated by the enemy. During the nine months that he occupied this position he governed with a high hand, and the council of Pennsylvania preferred charges of misconduct, for which he was tried by a court martial, and in January, 1780, was sentenced to be reprimanded by the commander-in-chief, who performed the unwelcome duty in as lenient a spirit as possible. Although in presenting his case to the court he had announced in exalted terms his devotion to the American cause, it was subsequently discovered that for many months previous he had been in secret and treasonable correspondence with the enemy. His marriage while in Philadelphia with Miss Shippen, a lady of strong tory predilections, also predisposed him to look favorably upon any scheme of betrayal of his country. In this frame of mind he solicited and received the command of the works at West Point, alleging that his wounds still precluded him from active service in the field. He entered upon his new duties on Aug. 3, 1780, and established his headquarters at a house on the opposite bank, which had formerly belonged to Col. Beverley Robinson of Virginia, a tory. He had now been nearly 18 months in treasonable correspondence with Sir Henry Clinton, the British commander-in-chief at New York, and his immediate object was the surrender to him of West Point, then considered the key of communication between the eastern and southern states. The correspondence was conducted on the part of Clinton by his adjutant general, Major André, who used the pseudonyme of "John Anderson," while Arnold signed himself "Gustavus." In September, 1780, the plot being ripe, Arnold requested a personal interview with André at headquarters to settle the final details. On the 18th, the very day when this meeting should have taken place, the arrival of Washington and his suite at Verplanck's Point, on his way to Hartford to meet the French admiral Rochambeau, greatly embarrassed Arnold; but with characteristic audacity he showed him a portion of the treasonable correspondence having reference to the proposed conference, but which was so artfully worded as to disarm suspicion. Washington strongly advised Arnold to hold no meeting with persons coming from within the enemy's lines, as such an act, taken in connection with the recent court martial, might injure him in public estimation. On the night of the 21st the meeting with André, who had disembarked from the British frigate Vulture, finally took place at the foot of Clove mountain, a few miles below Stony Point. It was continued into the morning of the 22d, when, having given André a safe-conduct to pass him through the American lines, and six papers disclosing the plans of the works at West Point and the strength of the garrison, Arnold returned to his headquarters. The Vulture having meanwhile dropped down stream in consequence of a fire from the American batteries, André was obliged to return to New York along the eastern bank of the Hudson, and on the 23d was captured near Tarrytown. The papers found on his person were at once despatched to Washington at Hartford; but Col. Jameson, the officer in whose charge he was placed, committed the error of informing Arnold of the circumstance. After a hurried parting with his wife, Arnold was rowed in his barge to the Vulture, where he then basely delivered the oarsmen to the enemy; but Sir Henry Clinton at once ordered them to be released. On the same day the papers found on André's person were examined by Washington, and the whole treasonable scheme was exposed, just in time probably to defeat the most formidable plan ever organized to crush the cause of American liberty. Arnold was rewarded for his treachery by a commission as major general in the British army, and took part in several marauding expeditions into Connecticut and Virginia. After the surrender of Cornwallis he went to England and received a considerable sum in money from the British government. His subsequent life was neither prosperous nor happy. He was shunned by men of honor and repeatedly insulted. After several unsuccessful attempts to engage in business in British America and the West Indies, he sank into utter obscurity.—**James Robertson**, second son of the preceding, born in the United States in 1780, died in London, Dec. 27, 1854. He entered the British army in 1798, and served with credit in many parts of the world. For several years he was an aide-de-camp of William IV. Three years before his death he was promoted to be a lieutenant general.

ARNOLD OF BRESCIA (ARNALDO DA BRESCIA), a religious reformer, born at Brescia in Italy about the beginning of the 12th century, executed at Rome in 1155. He first appears in history as a scholar of Abélard, and was distinguished for eloquence. Returning from France to Italy, he attacked the luxury, venality, indifference to religious duties, and degrading worldliness of the clergy. His special doctrine was the antagonism of the church to the world. He held that the same man ought not to hold secular and religious office. This doctrine speedily made for him a party. Disturbances broke out, the clergy protested, the bishop of Brescia became alarmed, a complaint was sent to Rome, and at the council of the Lateran in 1139 Arnold was condemned as a disturber of the peace, forbidden to preach, and banished from Italy. His party, however, was not annihilated, nor his influence destroyed. In France, where he went to visit Abélard, whose name had been joined with his in the sentence of condemnation, and in Switzerland, where he preached for some years, he gained many adherents. Meanwhile, a bold application of his principles had been attempted in Rome itself. The demands of the papal see excited a popular movement (1143), and secular authorities were appointed to govern the state, while the pope, Innocent II., was restricted to the exercise of spiritual authority. This change in the national government being opposed by Innocent and his successors, a revolt broke out in 1145, and Pope Eugenius III. was forced to leave the city. Arnold went to Rome and assumed the direction of the popular movement; but the license of rioters hindered his plans, reaction came, one by one his reforms were nullified, and the unfortunate murder of a cardinal in the street enabled Pope Adrian IV. to turn against this alleged disturber of the peace and enemy of the church the sympathies of the populace. Arnold was with his friends driven from the city, and sought refuge with some noblemen of Campania. When the emperor Frederick Barbarossa came to Rome to be crowned, the pope asked him to have Arnold arrested. The order was given and executed, and Arnold was strangled, and his body burned and thrown into the Tiber.—The character of Arnold has been variously represented. Baronius calls him "the father of political heresies." The truth appears to be that he was a great reforming spirit, who fell into many errors and excesses, but whose leading idea was to renovate the clerical order after the apostolic model. Baptist writers claim him as one of the forerunners of their faith, the denial of infant baptism being among the charges against him at the Lateran council of 1139. A sect called Arnoldists existed in Italy for some time after his death. They were condemned at the council of Verona in 1184, and the name occurs in a law against heretics of Frederick II. (1224).

ARNOLD, Christoph, a German astronomer, born at Sommerfeld, near Leipsic, Dec. 17, 1650, died April 15, 1695. He was a farmer, but devoted his leisure to astronomy, erected an observatory at his own house, and was the first to call attention to the comets of 1682 and 1686. He also acquired fame by his observation of the passage of Mercury across the sun's disk, Oct. 31, 1690. Leipsic gave him a present of money and exempted him from city taxation.

ARNOLD, Edwin, an English author, born June 10, 1831. In 1852 he obtained at Oxford the Newdegate prize for a poem, became in 1854 a schoolmaster in Birmingham, and subsequently was president of the Sanskrit college at Poonah, India, till 1860. He has since been a journalist in London, and has published "Poems, Narrative and Lyrical;" "Griselda, a Tragedy, and other Poems" (1856); "The Wreck of the Northern Belle" (1857); "History of the Administration of India under the late Marquis of Dalhousie" (2 vols., 1862–'4); "Poets of Greece" (1869); and "The Light of Asia," a poem on Buddha (1879).

ARNOLD, George. See supplement.

ARNOLD, Isaac N. See supplement.

ARNOLD, Matthew, an English poet, son of Thomas Arnold, born at Laleham, Dec. 24, 1822. He was educated at Winchester, Rugby, and Oxford; won the Newdegate prize for English verse by a poem entitled "Cromwell;" in 1845 was chosen fellow of Oriel college; and from 1846 to 1851 was private secretary to Lord Lansdowne. Having married, Mr. Arnold received an appointment as one of the lay inspectors of schools under the committee of the council of education. In 1849 he published anonymously a small volume of poems under the title of "The Strayed Reveller and other Poems." In 1852 a second volume appeared, "Empedocles on Ætna, and other Poems." In 1853 a new volume was issued in his own name, followed by a second series, the two containing selections from the previous collections along with some fresh pieces. From 1857 to 1867 Mr. Arnold was professor of poetry in the university of Oxford. His later noteworthy works are: "Balder;" "Merope, a Tragedy" (1858); "On Translating Homer" (1862); "Essays in Criticism" (1865); "Study of Celtic Literature" (1867); "Schools and Universities on the Continent" (1868); "Culture and Anarchy" (1869); "St. Paul and Protestantism" (1870); "Friendship's Garland" (1871); "Literature and Dogma" (1873).

ARNOLD, Samuel, Mus. Doc., an English composer, born in London, Aug. 10, 1740, died there, Oct. 22, 1802. At the age of 28 he became composer to Covent Garden theatre, and in 1766 also to the Haymarket, in 1789 conductor of the academy of ancient music, and in 1793 organist of Westminster abbey. He published 47 operas, of which "The Maid of the Mill" was for many years a favorite on the stage. "The Prodigal Son," an oratorio, also had remarkable success. About 1786 he published a collection of cathedral music (4 vols.), which has always been held in high esteem. Under the patronage of George III., he published 40 volumes of Handel's works in score.

ARNOLD, Samuel Greene. See supplement.

ARNOLD, Thomas, D. D., an English teacher and historian, born at West Cowes, Isle of Wight, June 13, 1795, died at Rugby, June 12, 1842. When 8 years old he was sent to Warminster, and at 12 to Winchester college, where he was known as an indolent, shy, and restless boy. In 1811, having obtained a scholarship at Corpus Christi, he removed to Oxford, where in 1814 he took a first class degree, and the year after was elected fellow of Oriel college. In 1815 and 1817 he was chancellor's prizeman for the Latin and English essays. In 1818 he was ordained deacon, and from 1819 employed himself at Laleham, near Staines, in the preparation of young men for the universities. From this point his career seems to have fairly commenced. On his application for the post of head master of Rugby school, he was elected, though others had applied before him, the trustees being assured that "he would change the face of education all through the public schools of England." He entered upon the duties of this office in August, 1828, having shortly before taken priest's orders. Dr. Arnold enlarged the basis of education at Rugby by adding to the classics other departments of learning; but his influence was chiefly felt in the practical bearing upon life and character which he gave to all education, and in the lofty Christian spirit which he endeavored to impart to his scholars. He substituted for the old system of fagging a responsible supervision of the younger lads by the boys in the highest class—a plan that was criticised in some quarters, but which he defended in the "Journal of Education" (1834–'5). He was a strenuous opponent of the new school at Oxford. He took part in the debate upon church and state, wrote a pamphlet in 1833 upon "Church Reform," and later "Fragments upon the Church," in which he urged that church and state, instead of being formally united as two separate interests, should rather be identified, the state being in fact the working church. In 1835 he accepted a fellowship in the senate of the new London university, but resigned it three years later on account of the refusal of the senate to make an examination in the New Testament obligatory upon candidates for a degree. He delivered lectures before the Rugby mechanics' institute, and in 1831 started a periodical called the "Englishman's Register," of which only a few numbers were published. He declined political preferment; and when Lord Melbourne appointed him to the regius professorship of modern history at Oxford, he welcomed it as the post of all others best suited to him. He held it but one year, when he suddenly died of heart disease. His "History of Rome," a work of great merit, in 3 vols. (1838, 1840, 1842), embodying the results of Niebuhr's investigations, carried the narrative to the end of the second Punic war; a fourth volume extends the history, in fragments, to the time of Trajan. He also published an edition of Thucydides with notes, a course of lectures on modern history, five volumes of sermons, and a volume of miscellaneous writings. His correspondence in two volumes was published, with a memoir, by the Rev. A. P. Stanley.

ARNOLD, Thomas Kerchever, an English clergyman and author, born in 1800, died March 9, 1853. He was educated at Trinity college, Cambridge, and in 1838 published the first of a numerous list of introductory books for the study of the Greek, Latin, Hebrew, German, French, and Italian languages. These works were extensively used in England and America. He next prepared a series of school classics, combining portions of the best Greek and Latin authors; and the full classical series of Mr. Arnold covers the entire ground from first lessons to accomplished scholarship. In addition to these labors, he was an occasional writer on religious and ecclesiastical questions, and published a volume of sermons.

ARNOTT, Neil, a Scotch physician, born near Montrose in 1788, died in London, March 4, 1874. He studied medicine in Aberdeen and London, paying special attention to natural philosophy, and through the influence of his instructor, Sir Everard Home, was appointed surgeon in the naval service of the East India company. The position gave him opportunity for scientific observations in different parts of the world. In 1811 he began to practise in London, but continued his scientific investigations. His "Elements of Physics, or Natural Philosophy, General and Medical, explained in plain or non-technical Language" (1827), contained the substance of lectures previously delivered, and was a successful attempt to illustrate scientific principles in the language of common life. It was translated into different languages, and passed through five editions in England within six years. In 1835 Dr. Arnott was appointed one of the senators of the university of London, in 1837 one of the physicians extraordinary to the queen, and in 1838 a fellow of the royal society. He published at the same time his "Essay on Warming and Ventilating." He invented numerous contrivances for health and comfort, such as the stove and ventilator to which his name is given, and the water-bed or floating mattress, which has often been used with the happiest results. In 1854 he received from the royal society their Rumford medal; and in 1855 the jurors of the universal exhibition at Paris awarded him a gold medal, to which the emperor added the cross of the legion of honor.

ARNOULD, Sophie, a French actress, born in Paris, Feb. 14, 1744, died in 1803. Her father, an innkeeper, gave her a good education, in addition to which she possessed a charming face and figure, a voice of great flexibility and compass, and an unusual share of wit. Some ladies attached to the court of Louis XV., having heard her sing at evening service during Passion week, induced the royal chapel master to employ her in the choir. Here she was not long in attracting the attention of Madame de Pompadour. Her début upon the stage at the age of 13 soon followed, and for 21 years, between 1757 and 1778, she was the reigning favorite at the French opera. Her beauty, vivacity, and generosity attracted such men as Diderot, D'Alembert, Helvétius, Mably, Duclos, and Rousseau, who sought her society. She was as witty as she was licentious, and the most eminent poets celebrated her charms in verse. Her *bons mots*, of which many have been collected, are brilliant and pointed. At the commencement of the revolution she retired to a country house at Luzarches, which had formerly been a parsonage, and over the door of which she inscribed the words, *Ite, missa est*, where she seems to have passed the rest of her days. One of her natural sons, a colonel of cuirassiers, was killed at the battle of Wagram.

ARNSBERG, a town of Prussia, capital of a district of the same name in the province of Westphalia, situated on a hill partly surrounded by the Ruhr, 44 m. S. S. E. of Münster; pop. in 1871, 4,734. The new portion of the town dates from the early part of this century. In the vicinity are the ruins of an old castle where the famous Vehmic court used to be held. The once important county of Arnsberg came in 1368 into the possession of the electorate of Cologne, and the town was subsequently for some time capital of the duchy of Westphalia, of which Arnsberg is the most populous and prosperous district.

ARNSTADT, a town of Germany, in the principality of Schwarzburg-Sondershausen, situated on the Gera and on the northern slope of the Thuringian Forest, 10 m. S. of Erfurt; pop. in 1871, 8,603. Among the most notable buildings is a church built in the 11th century. The town has a castle belonging to the reigning family, and a gymnasium with a considerable library. Arnstadt is one of the oldest towns of Thuringia, being mentioned as early as 704. It was formerly known as an emporium for the trade in timber and fruit, and has in modern times become a seat of manufactures.

ARNSWALDE, a town of Prussia, in the province of Brandenburg, 41 m. S. E. of Stettin, between three lakes; pop. in 1871, 6,522. The town has a church celebrated for its bells, a large chemical manufactory, and extensive manufactures of linen and woollens.

AROLAS, Juan, a Spanish poet, born in Barcelona, June 20, 1805, died in Valencia in November, 1849. He was a member of the order of the Piarists, and chaplain in the normal school of Valencia, and became insane five years before his death in consequence of religious exaltation. His poetical works include *Libro de amores, poesias pastoriles, cartas amatorias* (3 vols., Valencia, 1843); *Poesias caballerescas y orientales* (new edition, 1850); and translations of Chateaubriand's poems and *Moïse*. A complete edition of his poems was published in Valencia in 1860, in three volumes.

AROLSEN, a town of Germany, capital of the principality of Waldeck (which according to the convention of 1867 is now administered by the king of Prussia), on the Aar, 12 m. N. of Waldeck; pop. in 1867, 2,148. The palace contains many works of art and a library of 30,000 volumes. In the parish church are statues by Rauch, and by Kaulbach, who was born here.

AROOSTOOK, a county comprising the N. and N. E. portions of Maine, and bordering on the provinces of Quebec and New Brunswick; area, 6,800 sq. m.; pop. in 1870, 29,609. The surface is undulating, with a few mountain peaks, the loftiest of which are Chase's Mount and Mars Hill. The St. John's river forms the N. boundary and flows through the W. part of the county, and is navigable for vessels of 50 tons. It is also watered by the Aroostook, a W. tributary of the St. John's, Allagash, Mattawamkeag, and several smaller rivers; and there are many small lakes and ponds. The soil is generally very fertile, but a great part of the surface is still covered by pine forests. In 1870 the county produced 46,946 bushels of wheat, 532,151 of oats, 360,450 of buckwheat, 880,701 of potatoes, 48,052 tons of hay, 86,178 lbs. of wool, 523,510 of butter, and 53,186 of maple sugar. Capital, Houlton.

ÁRPÁD, the Magyar national hero, son of Álmos, who led the Magyars into Hungary, died, after a reign of about 18 years, in 907. He completed the conquest begun by his father, carried on wars with the Bulgarians and Moravians, conquered Transylvania, Croatia, and Slavonia, and made predatory incursions into Germany and northern Italy. He also successfully began the organization of his country. His only surviving son, Zoltán, continued the Árpád dynasty, which in 1000 assumed the royal dignity, and in 1301 became extinct in the male line with Andrew III.

ARPINO (anc. *Arpinum*), a town of S. Italy, in the province of Terra di Lavoro, 8 m. S. of Sora; pop. about 6,500. It has manufactures of woollen cloth, paper, and parchment. It was originally a town of the Volsci, and subsequently of the Samnites, from whom it was wrested by the Romans in 304 B. C. It is the birthplace of Marius and Cicero, whose brother Quintus had a celebrated villa called Arcanum.

ARPINO, Giuseppe Cesari d'. See CESARI.

ARPINUM. See ARPINO.

ARQUA, or **Arquata**, a village of northern Italy, among the Euganean hills, 12 m. S. W. of Padua; pop. 2,600. It is famous for containing the house and tomb of Petrarch. He died here at his villa in July, 1374, and was laid in a sarcophagus of red marble, raised on four pilasters, on an elevated base.

ARRACK (Arabic, literally perspiration), a strong spirituous liquor distilled from fermented rice and from *toddy*, the fermented sap of the cocoanut tree, and also from rice and sugar or rice and molasses fermented with cocoanut juice. The word is used as a generic term for all distilled liquors, as there are aracks of grapes, berries, figs, dates, and even of wild flowers, in various parts of the East. Arrack is sometimes made by adding different bitter principles and mastic to the fermenting liquor, putting it into leather bottles, and allowing it to undergo slow fermentation under the earth for a year, and then subjecting it to a crude distillation. It is largely imitated in various parts of Germany and Holland. The arrack of commerce is derived from Batavia, Goa, Ceylon, Madras, and Colombo. The best arrack in the Levant is obtained from the island of Scio. In order to prepare it for the long voyage some oil is added, which on the addition of warm water often imparts a disagreeable oily taste and smell. It is used in the composition of punch and for medical and culinary purposes. Anise seed and various aromatic herbs are sometimes steeped in it to improve its flavor.

ARRAN, an island forming part of the Scotch county of Bute, and lying in the great bay between the peninsula of Cantyre and the main coast of Scotland, 5 m. E. of the former, from which it is separated by Kilbrannan sound, and 13 m. W. of the latter, from which it is separated by the frith of Clyde. Its greatest length is about 21 m., greatest width about 12 m. The surface is high and rocky, and the scenery wild and picturesque. In the N. part the rugged mountain Goatfell rises to a height of 2,865 ft. The coast rises in many places into bold basaltic cliffs; in others it is low and sandy. The island, of which a large portion is the property of the duke of Hamilton, is divided into two parishes, Kilmory and Kilbride; total pop. about 5,500, supported by the products of small farms, and by trifling local industries. The three villages are Brodick, Lamlash, and Shedog. Many ancient monuments, supposed to have been erected by the Druids, are found in Arran. Gaelic is the ordinary language of the people, though English is generally understood.

ARRAN, Isles of, three small islands lying at the entrance of Galway bay, off the W. coast of Ireland; total area, about 18 sq. m. The largest is Inishmore, the northern island; the next in size, Inishmain, lies in the centre; and the southern one is called Inishere. They are low and barren, producing only potatoes and the most hardy grain; yet the greater part of their surface, which is divided into plots generally less than an acre in extent, is under cultivation by a wretched population of about 3,200, who live in miserable huts. On one of the northern cliffs of Inishmore stands a very ancient fort built by the Belgæ, it is supposed, early in the 1st century. Other structures of equal age are found in all three islands; and there are also numerous ruins of the oratories, dwellings, and churches of early Irish hermits, many of whom retired to these isolated places in the 6th and 7th centuries, giving to Inishmore especially the name of Arran of the Saints (*Aran-na-naomh*). The Irish earls of Arran take their title from these islands.

ARRAN, Earl of, the title of the holders of the Scotch peerage of Arran, created for Sir Thomas

Boyd in 1467, but in 1508 passing by royal decree from his son, who had displeased the king, to the house of Hamilton, the successive heads of which bore this as their chief title till the higher rank of marquis and afterward of duke of Hamilton was conferred upon them.—**James Hamilton,** second earl of his name, died Jan. 22, 1575. He was appointed regent of Scotland upon the death of James V. in 1542, and guardian of Mary Stuart, to whom he endeavored to marry his son. Finding this impossible on account of the intrigues of Henry VIII. of England and the earl of Lennox, who also wished by this marriage to obtain the Scottish crown for their own children, Arran finally consented to her union with the dauphin of France, afterward Francis II. For his aid in promoting this alliance, the French king made him duke of Châtelherault, in Poitou, and this French title is still borne by the dukes of Hamilton.—**James,** son of the preceding, conceived a violent passion for Mary Stuart, and when his father failed to obtain for him her hand, he became insane from disappointment, and from the knowledge of her personal indifference to him. While in this state he was prevailed upon to enter into a plot against her throne; but becoming conscious during a lucid interval of the iniquity of the plan, he confessed his share in it. On account of his evident insanity he was only kept in a mild imprisonment; but he took no further part in political affairs.—The titles and estates of Arran passed to his brother John, who was created marquis of Hamilton in 1599. (See HAMILTON.)—There is also an Irish earldom of Arran, conferred on Sir Arthur Gore in 1758 (earl of the Arran Islands); but none of its incumbents have become prominent in history.

ARRAS (anc. *Nemetocenna* or *Nemetacum*, capital of the Atrebates), a city of France, capital of the department of Pas-de-Calais, and formerly of the province of Artois, on the river Scarpe, 100 m. N. by E. of Paris; pop. in 1866, 25,749. It was fortified by Vauban, and has manufactures of thread, lace, and woollens, with an important trade in grain. The woollen manufactures have been famous from very remote times, and the tapestries of Arras during the middle ages were so celebrated that the name of the town was generally given to this species of hangings. Arras has been the see of a bishop since 390. It was the seat of ecclesiastical councils in 1025 and 1490. When Louis XI. seized Artois on the death of Charles the Bold of Burgundy in 1477, Arras resisted, whereupon the king assaulted the town in person, drove out the inhabitants, replaced them by people drawn from all parts of France, and changed the name of Arras to Franchise. Robespierre was both a native and a representative of Arras.

ARRAWAKS, or **Lokono,** a tribe on the Berbice and Surinam rivers, Guiana, noted for their mild and peaceful disposition and friendship for Europeans. They were, however, formerly a large, powerful, and warlike tribe, extending from the right bank of the Orinoco to the Surinam, and held all the Carib tribes in subjection, driving some to the Antilles. The French found them so powerful that they used them as a protection against other tribes. The Moravian missionaries in the 18th century did much to civilize them, and studied their language, printing in it various books for their converts. The fullest material for the study of their speech, which is regarded as one of the softest in America, is in the manuscripts of these missionaries preserved by the American philosophical society (Philadelphia). They were divided into families, apparently on the same principle as the Iroquois, but in greater number, as no fewer than 50 are enumerated. Descent was in the female line.

ARREST, the taking a person or thing by authority of the law and into its custody. I. In civil cases, arrest is the apprehension of a person by lawful authority for the purpose of compelling him to answer in a civil action. The present tone of the English law on the subject was probably first given by a statute of George I. (1726). That act, "to prevent frivolous and vexatious arrests," provided that no person should be held to special bail on any process issuing out of any of the superior courts, unless the cause of action were of the amount of £10, and on process of any inferior court unless it were of the amount of 40 shillings. These amounts were raised from time to time, and by 7 and 8 George IV., ch. 71, no person could be held to special bail, on process issuing out of any court, when the amount involved was less than £20. The 1 and 2 Victoria, ch. 100, abolished arrest on mesne process, but provided that if a plaintiff, who could before that act have had the defendant arrested, should show that he had a cause of action, or had sustained damages to the amount of £20, and that there was reasonable cause for believing that the defendant was about to quit England unless he were apprehended, a court might issue its warrant for the arrest of the defendant and hold him to bail in the amount of the debt or damage. This act and several others were displaced by the present act, 32 and 33 Victoria, ch. 62, which provides again that no person shall be arrested on mesne process in any action, and contains a similar provision to that just quoted from the former act of Victoria, but requiring further that the plaintiff shall show, except in suits for penalties, that the threatened absence of the defendant from the country will materially prejudice him in the prosecution of his action. But the cause of action must now be of the amount of at least £50.—In some of the United States arrest in civil causes still remains, but in New York and in many others it is allowed only in such cases as the following, or in cases of similar character, namely: in actions not arising out of contract, when the defendant is not a resident of the state or is about to leave it; or in cases of a tortious nature, or for injuries to person and character, or for wrongfully converting property; or in actions for fines or penalties, or for the recovery of moneys or property received and fraudulently withheld by persons acting in a fiduciary capacity; or where the property sought is concealed or disposed of with the intent to deprive the plaintiff of the benefit of it; or when the defendant has been guilty of a fraud in incurring the obligation or in concealing or disposing of the property for the recovery of which the action is brought; or when the defendant has disposed of his property, or is about to do so, with the intent to defraud his creditors. It will be seen that these provisions exclude arrest in common actions of contract and debt, and this is the spirit of the recent legislation on this head.—By the constitution of the United States, the members of congress are exempt from arrest in all cases, except treason, felony, or breach of the peace, during their attendance at the sessions of the respective houses, and in going to and returning from them to their homes. In New York (and probably there are similar exemptions in every state) a member of the legislature is privileged from arrest on civil process during his attendance at the session of the houses, except on process issued in any suit for forfeiture, misdemeanor, or breach of trust in any office or place of public trust held by him; and for 14 days previous to, and while going to or returning from such session; and also for 14 days after any adjournment, or while absent on leave of his house. Ambassadors and other public ministers and their servants, and consuls and vice consuls, are also exempt from all process issuing out of a state court. Parties to suits, while attending at or going to or returning from courts or hearings before referees, or before arbitrators under a statute or rule of court, to attend the trial or hearing of their causes by these tribunals, and their witnesses subpœnaed and their attorneys and counsel, are also exempt. Attorneys and counsellors are generally exempt during the actual sittings of court, and while employed in any cause pending there. Married women are generally privileged from arrest on mesne process in all causes whatsoever, and no female can be arrested in New York for any cause except wilful injury. Soldiers and sailors in the service of the United States are exempt in any cause of debt or contract. And usually, by special statutes, voters on election day, members of the state militia, and certain public officers are also privileged.—A civil arrest may be made at any time except on Sundays and legal holidays, and at any place except in presence of a court. An officer may not break the outer door of defendant's house to arrest him in a civil case, though once in the house he may break inner doors to come at him; but after an arrest and escape, the officer may break open even an outer door to retake his prisoner. An arrest of a person by a wrong name cannot be justified even though he was the person intended, unless he was commonly known by either name. The party arrested may ordinarily be released at once upon giving bail; but when the arrest is on final process, as for example when it is to enforce an execution against the person, the defendant, if he has no property, may usually be discharged by taking the benefit of such acts as are provided for the relief of poor debtors; for mere imprisonment for debt is for the most part abolished. II. In criminal cases, an arrest may be made, under certain conditions, either by a public officer by virtue of his general authority as a conservator of the peace, or upon a warrant or other express process or command, issued by a court or competent judicial officer; or it may be made by a private unofficial person upon an implied permission of the law. If any person, whether a public officer or a private person, sees another committing or attempting to commit a felony, it is not only his right but his legal duty to arrest him, even without a warrant. Indeed, if he does not at least try to arrest him, he is technically guilty of a misprision of the felony. And if a private person make an arrest for a felony, without a warrant, in good faith and upon a reasonable suspicion that the person whom he arrested had committed the offence, he will not be liable either civilly or criminally though his suspicions turn out to have been unfounded, provided the felony was actually committed by some one. Even in respect to crimes of less degree than a felony, a private person may make an arrest, though there is not in such cases the same legal obligation as in the case of felonies. Thus, in case of an affray or breach of the peace, any person may on the spot, and without any warrant, detain any of the offenders. Neither a private person nor an officer can make an arrest without a warrant when the time of the commission of the offence is fairly past. A constable is not justified in taking a person into custody without a warrant for a mere assault, unless he is present when the act is done. But constables, police officers, and the like officials may on reasonable suspicion arrest a person for a past felony, and they will be protected in such an act, unlike a private person in this respect, although no felony has been committed by anybody. Such officers may ordinarily make arrests without special authority, in order to prevent imminent breaches of the peace. An officer may call bystanders to help him in making an arrest, though he is acting without a warrant; and a refusal to give such help is indictable at common law. An officer may also apprehend any one who interferes to prevent his making an arrest, and it is said that he may even take into custody one who encourages another already arrested to resist.—It seems to be the better opinion that an officer, especially one who is commonly known to be such, like a sheriff or constable acting in his proper precinct, and probably as well one who, from being elected or appointed in the usual way, may be justly presumed to be known to be such officer, need not show his warrant nor even declare his official character before making an arrest; for the power to make the arrest might be lost by going through the form of producing and explaining the process. If the officer have no proper warrant or authority, he is liable in damages to the person arrested; but if the party resist before investigating the officer's right, and the officer has the authority in fact, then the party is indictable for resisting the officer in the proper discharge of his duty. When an officer acts under a warrant, he is justified in executing it, though it was unlawfully issued in fact, provided it is in due and regular form on its face, and the magistrate had general jurisdiction of the case. The question of jurisdiction the officer must decide for himself and at his peril; and if the process is invalid on that ground, the officer is liable in damages. The maxim of the law that a man's house is his castle, does not hold good so far as to secure asylum to criminals; and when a felony has been certainly committed and the guilty party takes refuge even in his own house, an officer or a private person, even without a warrant, may break into the house to take him, after a proper demand for admission. An officer in such a case, acting in good faith on the positive information and charge of another, would be excused even though the party arrested were not the guilty party. But a private person, in order to justify the breaking of doors without a warrant, must in general prove the actual guilt of the party arrested, and it will not suffice for him to show that a felony was actually committed by some person, or that reasonable grounds of suspicion existed. When an officer has a warrant, he may, even before an indictment, break open doors in cases of treason or felonies or breaches of the peace; but it seems to be the law that, without a warrant and before indictment, he may not do so in the case of mere misdemeanors unaccompanied with violence. After indictment, a person guilty of an offence of any degree may be arrested in any place, and no house can give him sanctuary; and not only his own house, but the house of a third person, may in such a case be broken into, after reasonable demand, for the purpose of taking him.—To constitute an arrest, there must ordinarily be some physical force or restraint imposed upon the person, though there need not be more than the slightest. Mere words are not enough, unless upon these the party submits without the manifestation of any force. The mere laying of the hand upon the prisoner, or preventing his egress from a room, with words indicating the intent to arrest him, is sufficient. If an officer attempts to arrest one committing a felony, and he takes to flight to escape arrest, the officer may, after demanding that he stop and surrender, shoot him to compel him to do so. But the officer may not do this in the case of a mere misdemeanor. And if an officer or other authorized person, in attempting to make an arrest, is resisted, and in overcoming the resistance, and in using what seems to him to be necessary force, kills the man, he will be held innocent; and if a person already arrested attempts to escape, an officer is justified in killing him if that is necessary to prevent his escape. But whenever an unlawful arrest is attempted or made, as for example when an officer arrests for a misdemeanor without a warrant, and neither on fresh pursuit nor when a breach of the peace is threatened, the party arrested may lawfully resist; and if in making such resistance he take the officer's life by mischance, it is only manslaughter. When a prisoner is arrested without a warrant, he should be handed over without delay to some magistrate. When the arrest is made under a warrant, all its requirements must be observed, and such a process usually directs the officer to take his prisoner to some court or justice. —It is a common practice for police officers and constables to search a prisoner immediately after his arrest, and take from him everything found in his possession. There are several English cases reported on this subject, and it is laid down in them that there is no legal authority for such a proceeding, unless possibly it be in those cases where the things taken are probably the fruits of the crime with which the prisoner is charged. In several such cases in England the judges have severely denounced the practice, and have ordered money especially to be returned to prisoners where their possession of it did not appear to have any connection with the offence for which they were taken, and on the ground that therefore there was no possible justification for depriving them of it.

ARRHIDÆUS, Philip, a natural son of Philip of Macedon and the dancing girl Philinna of Larissa, died in 317 B. C. After the death of Alexander the Great in 323, the Macedonian troops in the East nominated Arrhidæus king, with the proviso that the child with which Alexander's wife Roxana was pregnant should be associated with him in the government. The claims of Arrhidæus were strengthened by the fact that his wife, Eurydice, was the granddaughter of Philip's elder brother and predecessor. Being of very feeble intellect, he was a mere puppet in the hands of Perdiccas. On the death of the latter (321), Arrhidæus and Eurydice were in Cappadocia, where Antipater, the regent of Macedonia, found them and took them over with him to Pella. After his death (319), the regent Polysperchon and the dowager grandmother, Olympias, set up, in preference to Arrhidæus, Alexander, Roxana's young son. Arrhidæus and Eurydice protested, and called in the aid of Cassander, Antipater's disinherited heir, but, falling into the hands of Olympias, were both murdered by her orders.

ARRIA, a Roman woman who immortalized herself by suicide, A. D. 42. Her husband, Cæcina Pætus, was condemned, as a traitor to the emperor Claudius, to put an end to his own life. As Cæcina hesitated to do it, his wife took up the dagger and stuck it to the hilt in her own bosom. Handing it back to her husband she said, *Pæte, non dolet* ("Pætus, it does not hurt"), and expired. Pætus at once followed her example.

ARRIAN (Flavius Arrianus), a Greek philosopher and historian, born in Nicomedia, Bithynia, about A. D. 100. He served under Hadrian and the Antonines, obtained the Roman citizenship, was prefect of Cappadocia, fought successfully there against the Alans, and after holding the consulship retired to Nicomedia about 150, and devoted himself to letters. Being a pupil and friend of the Stoic Epictetus, he published the philosophical lectures and an abstract (*Enchiridion*) of the practical philosophy of his master, and wrote dialogues, of which only fragments have reached us. He also published works upon history, geography, tactics, and hunting. The best of them is his excellent history of the campaigns of Alexander the Great. The Athenians made him a citizen of Athens under the name of his model in composition, Xenophon, his book being likewise called *Anabasis*. With this work his *Indica* is closely connected, in which he describes the Hindoos, their institutions and customs, as they were found by Alexander. He also wrote a history of Bithynia, an account of the circumnavigation of the Black sea ("The Periplus of the Euxine Sea"), "The Order of Battle against the Alans," and other smaller works.

ARRIVABENE, Giovanni, count, an Italian political economist, born in Mantua in 1789. In 1821 he was imprisoned seven months in Venice for refusing to denounce Silvio Pellico, of which 40 years later he published an account (*D'une époque de ma vie*, Brussels, 1861). Sentenced to death by contumacy in 1824, he spent some time in France and England, and has been since 1827 a resident and since 1840 a naturalized citizen of Belgium. He translated into Italian (Lugano, 1836) Mill's "Elements," and into French Senior's "Fundamental Principles of Political Economy;" and has written on benevolent societies and the amelioration of the working classes, besides *Situation économique de la Belgique* (Brussels, 1843).

ARROO, Arru, or **Aroe**, a group of about 80 islands in the Malay archipelago, north of Australia, between lat. 5° and 7° S., and lon. 134° and 135° E. At the end of them is a considerable reef of coral, where pearls and tripang abound. The products are pearls, mother-of-pearl, tortoise-shell, birds of paradise, and tripang. Dobbo, a town in the island of Wamma, is the entrepot of the islands, and imports calicoes, iron, hardware, and gunpowder, shipped from Singapore. The population numbers about 14,000, a few of whom are Christians. There are two or three native teachers from Amboyna.

ARROWROOT, a name loosely applied to the starch extracted from a number of roots and grains, as the maranta, manihot, tacca, arum, potato, &c. It was originally limited to the starch of the *maranta arundinacea*, a plant which grows in the East and West Indies, and which was considered a specific for the wounds caused by poisoned arrows. It is a simple food, in high repute for invalids. Not containing nitrogen, it is well adapted for producing fat and promoting the warmth of the body. According to Liebig, 4 lbs. of it contain as much carbon for supplying animal heat by its combustion as 15 lbs. of animal flesh. In its preparation the tubers are mashed, and the pulp is soaked in water. This dissolves out the starch, which is separated from the fibre by straining. After settling, the clear water is drawn off, and the starch washed with fresh water and again allowed to settle. It is finally dried in the sun.

Maranta arundinacea.

The most common adulterations are with the cheap potato starch, sago, and manioc or tapioca, all which can be detected by the microscope. The granules of the potato are of very irregular, ovoid, and truncated forms, and of various sizes, from $\frac{1}{200}$ to $\frac{1}{2000}$ of an inch in diameter, while the particles of the arrowroot are very regular ovoid forms, and of nearly equal sizes. Dilute nitric acid is also a good test. When triturated with it in a mortar, arrowroot changes into an opaque paste, which is some time in becoming viscid; but potato and flour starch thus treated form immediately a transparent, thick paste. From the inferior starches alcohol extracts an unwholesome oil of disagreeable odor, but none from arrowroot. The composition of the fresh root was ascertained by Benzon to be in 100 parts as follows: volatile oil, 0·07; starch, 26; vegetable albumen, 1·58; a gummy extract, 0·6; chloride of calcium, 0·25; insoluble fibrine, 6; and water, 65·5. Of the starch 23 parts are obtained in the form of powder, and the other 3 are extracted in the form of paste from the parenchyma with boiling water.—There is a so-called arrowroot brought from Florida, derived from a plant allied to the sago palm, and sometimes known as coontie. The plant grows among the everglades in great profusion. It is of an inferior quality, containing only 12 per cent. of starch.

Florida Arrowroot (Coontie) and Fruit.

ARS. See Ars-sur-Moselle.

ARSAMAS. See Arzamas.

ARSENIC (Gr. *ἀρσενικόν* or *ἀῤῥενικόν*, male, from its power in destroying), the common name of the white oxide of arsenic, or arsenious acid. In ancient times the name was applied to a reddish-colored mineral compound of arsenic and sulphur, a substance in use then as a medicine, and also in painting. Metallic arsenic occurs native in veins in the crystallized rocks and older slates, and it is also prepared by subliming its oxide in presence of a reducing flux, and protected from the air. Many modern chemists do not regard it as a metal, though it is commonly treated as such. Combined with oxygen, it unites with metals, forming arsenites and arseniates of these metals, but is never itself the base of any salt. The ores of the metal are not therefore carbonates and sulphates of its oxide, but combinations of the metal itself with sulphur, forming the sulphuret, and this combined with iron, cobalt, or nickel; or they are oxides of the metal, or else compounds of its oxides with other metals. It is remarkable as the most volatile and one of the most combustible of the metals, is readily sublimed at a temperature of 360° F., apparently before it melts, and at a greater heat it takes fire and burns with a pale blue flame. In subliming, it gives out dense fumes of a peculiar garlicky odor, which distinguish it from other substances even when present in very minute quantity. It is more brittle than antimony, and may be reduced to fine powder in a mortar. Freshly prepared, it has a brilliant metallic appearance, a bluish-white color, and crystalline structure; but in the air the metal becomes black and crumbles to powder. In water it may be kept without change. Its specific gravity is 5·96. It is the softest of the solid metals, its hardness being rated on the mineralogical scale at 3·5. Arsenic readily combines as an alloy with other metals, rendering them more fusible and brittle. Its presence is particularly injurious in iron ores, making the cast metal exceedingly brittle; but it gives great fluidity to the melted iron, so that for fine castings that do not require much strength, but sharply defined and delicate outline, it is sometimes desirable. It also increases the brightness of some alloys. It is not employed for any useful purposes in the metallic state.—Arsenious acid, or white arsenic, is the most common combination of this metal. It is the sublimate, which escapes when arsenic is heated in the open air. The metal combines in the proportion of 1 equivalent with 3 of oxygen, the compound consisting of arsenic 75·76 per cent. and oxygen 24·24 per cent. The sublimate, after exposure, is a white powder, but may be collected in the form of a glassy, transparent cake, or crystallized in octahedrons. It is partially soluble in boiling water, and less so in cold water. The solution is slightly acid, having but a feeble reaction upon litmus paper. The following are some of the most important tests given for detecting the presence of this poison: The blowpipe develops its peculiar odor, with little liability of mistake, in arsenical matters, heated on charcoal. It also reduces the metal, and causes it to condense in the form of a metallic ring in the cold part of a glass tube, in which the substance containing arsenious acid has been placed with carbonate of soda and charcoal, and heated. The presence of arsenic may be shown by this method, when the particle containing it is so small as to be invisible to the naked eye, in the following manner, communicated by Prof. A. K. Eaton of New York: The microscopic particle is placed in a bulb of a small glass tube, and a fine splinter of charcoal is placed by the side of it. The whole should then be thoroughly dried. The neck of the bulb is next to be drawn out to a capillary tube, and cooled. On applying heat to the matter in the bulb, this produces by sublimation a plainly visible arsenical ring in the fine bore of the tube. The acid is precipitated from its solutions by sulphuretted hydrogen in the form of tersulphuret of arsenic of a lemon-yellow color. This is a very accurate test, and is so delicate that the yellow tint is apparent when only $\frac{1}{10,000}$ of the acid is present, and the precipitate when the arsenious acid is in the proportion of 1 part to 80,000 of water. It is precipitated in a white powder by excess of lime water, when forming $\frac{1}{500}$ part of the liquid. Ammonio-sulphate of copper gives an apple-green precipitate, apparent when the acid forms $\frac{1}{19,000}$ part. A still more delicate test is that of Prof. Reinsch, to place a slip of bright copper leaf in the aqueous solution acidulated with hydrochloric acid; a gray film of arsenic is deposited upon the copper, showing the presence of less than $\frac{1}{100,000}$ part of the acid. It is affirmed that even $\frac{1}{250,000}$ part of arsenic will not escape detection by this test. Nitrate of silver gives with it a yellow precipitate. It should be borne in mind, in attempting to determine the presence or absence of arsenious acid in any mixture in which organic substances, particularly those which are not volatile, are present, that some of these substances often produce very similar reactions, and, on the other hand, that they prevent or modify those which arsenious acid should produce in mixtures where no organic substances are present.—"Marsh's apparatus" has been long known as affording an easy means of detecting the presence of arsenious acid. The process depends on the property possessed by arsenic of forming a gas with hydrogen, and depositing itself in the metallic state upon the surface of a cold plate held over the flame of the burning gas. Hydrogen is prepared in the usual way, with granulated zinc and diluted sulphuric acid, in a glass flask provided with a tube of glass drawn out to a small orifice at its outer end; or a mere tube itself may be used, bent in the form of the letter U, one end drawn out, the other left open for introducing the materials, and closed with the thumb when in use. The hydrogen evolved should first be tested by burning it against a porcelain plate to prove that it is free from arsenic, and then the suspected liquid is to be introduced into the apparatus. If it contain any traces of arsenious acid, it will be shown by the bluish-white color of the flame, by the fumes of the acid, and brown shining spots of arsenic of metallic appearance will be deposited upon the porcelain plates. By heating the glass tube with a spirit lamp, metallic arsenic will be deposited in the colder part of it, forming a beautiful incrustation. The tube may be cut off at this point, the arsenic be converted into arsenious acid by heat, dissolved in hot water, and tested by the ammonio-sulphate of copper and nitrate of silver. This apparatus has been modified by Dr. Ure, so that the gas may be made at will to pass through the solutions by which the arsenic is precipitated, or to deposit the metallic incrustation in the tube, or the spots upon the plate. In its most simple form, however, it is a very useful contrivance for detecting arsenic. Antimony combined with hydrogen produces a spot that may be confounded with that of arsenic; but a solution of hypochlorite of soda instantly dissolves arsenical spots, and has no effect upon those of antimony. The arsenical spots also are volatilized at a temperature of 500° applied by a bath of olive oil, while the antimonial are unchanged. The proper solvent for organic matters supposed to contain arsenic is a mixture of 3 parts of hydrochloric and 1 part of nitric acid, and the quantity of this should be equal in weight to the organic substance, which before being dissolved should be cut into small pieces and dried at a gentle heat. The mixture being distilled, the arsenic, if present, comes over in the form of the volatile terchloride, which is then to be converted into the tersulphuret by sulphuretted hydrogen.—Arsenious acid is manufactured on a large scale at Altenburg and Reichenstein, in Silesia, from the ore called arsenical iron. In many other places it is obtained as a secondary product in the treatment of cobalt ores, and of other metallic ores with which arsenic is associated. The process consists in roasting the ore in large muffles, 10 ft. long and 6 ft. wide, in charges of 9 or 10 cwt. each, and collecting the vapors as a sublimate upon the walls of a succession of chambers, arranged in a tower through which they pass, and from which the uncondensable gases escape by a chimney. The muffles are placed inclining upward from their mouth, and are left open for the passage of heated air to aid in subliming the arsenic and converting it all into arsenious acid. A charge is worked off in about 12 hours, and is immediately followed by another. Charcoal is the fuel used, and as very little more heat is required than what is evolved by the chemical changes, the quantity consumed is very small. The purest arsenic is found in the flues and chambers nearest the furnace; in the upper chambers it is intermixed with the condensed sulphurous vapors. To purify it for market, it is all sublimed again. It is placed in cast-iron or porcelain pots, which hold 3½ cwt. each, and these are set vertically in a furnace. They open above into sheet-iron drums, which serve as condensers, and which are connected by a funnel with the condensing chamber. The fire must be carefully regulated to maintain the proper temperature for the acid to sublime in the form of a glassy cake. If the heat is too high, metallic arsenic is apt to be sublimed and mixed with the acid, appearing in dark spots. This must be picked out, or the whole sublimed over. The preparation of arsenious acid is a most dangerous occupation. The workmen employed generally die before the age of 40; indeed, their mean term of life is stated to be only from 30 to 35 years. Dumas states that they are compelled to avoid alcoholic drinks, and live principally upon leguminous vegetables, with plenty of butter, taking very little meat, and that very fat; and to each man two small glasses of olive oil are administered daily. In removing the acid from the chambers the workmen are completely enveloped in a dress and helmet of leather, the latter furnished with glass eyes. The passage for the air is protected with a wet sponge, by which it is filtered as it passes to the mouth and nostrils.—Arsenious acid is also found native, crystallized in octahedrons and capillary forms, at Andreasberg, in the Hartz, and at mines in Hungary and Bohemia. Combined with iron and sulphur, it forms the common ore of arsenic, called arsenical iron, or mispickel, which is of frequent occurrence in veins of iron pyrites, and of copper, lead, silver, zinc, cobalt, nickel, and tin ores. This ore is found in many localities in Connecticut and New Hampshire particularly, but is not rare in any of the New England states, or wherever pyritous ores are found along the range of the primary rocks of the Appalachian chain. The acid is also found in the ashes of many plants; in certain soils and mineral waters; and Orfila has detected it in the earth of graveyards. Its diffusion in minute quantities is very remarkable.—The uses of arsenious acid are principally in medicinal preparations, such as Fowler's solution, the basis of which is the arsenite of potash; or it may be given in substance in the dose of $\frac{1}{16}$ of a grain, combined with something to increase its bulk. Externally, arsenious acid is used as a caustic and forms the important ingredient in many "cancer cures." It is, however, a very painful application, and in the large majority of cases this method of removing tumors possesses no advantage over the knife. It may be absorbed from the surface to which it is applied, and give rise to the usual symptoms of arsenical poisoning. Internally, it is used chiefly in skin diseases, and in malarial fevers or the cachexia arising therefrom. In these affections it displays decided efficacy. It is also used occasionally in other diseases as a tonic. The symptoms which denote that its use has been carried sufficiently far are a peculiar swelling and stiffness of the face and eyes, and some irritation of the digestive apparatus.—The statements of Von Tschudi in regard to the habitual use of arsenic by the peasants of Styria, formerly regarded as unworthy of credit, have been confirmed by subsequent observers. Dr. C. Maclagan has published in the "Edinburgh Medical Journal" for September, 1864, an account of two cases, in one of which between four and five grains, and in the other six grains of white arsenic were taken in his presence. The urine passed by each of these men after taking the dose was analyzed, and found to contain the drug. They stated that they took a dose once or twice a week, and one of them said that the good effects lasted for eight days. They were both healthy. It is said to be given to horses to improve their wind and the smoothness of their coats.—Arsenic is sometimes chosen for criminal poisoning on account of its tastelessness. Its symptoms in the majority of cases, however, are tolerably characteristic, and it is almost sure to be detected by proper chemical tests. The symptoms and post-mortem appearances observed in the majority of fatal or severe cases are those of the most violent gastro-intestinal irritation, with proportionate depression of the circulation, intense burning pain of the stomach, obstinate vomiting, and extreme depression. In a few cases, however, death takes place rapidly by collapse, and there are no characteristic post-mortem appearances. When a poisonous dose of arsenic has been swallowed, recourse should be had to emetics or the stomach pump, unless vomiting takes place spontaneously. Demulcent drinks may be given until the proper antidote can be procured. This is the hydrated sesquioxide of iron, which should be kept at hand in the moist condition by every apothecary. The materials for making a fresh supply, namely, a solution of some persalt of iron, for instance the persulphate or the tincture of the chloride, and water of ammonia, should also be ready, since the oxide is most efficacious when freshly prepared. The two solutions should be mixed, and the resulting precipitate, after being rapidly filtered and washed, administered in the form of a paste. Recently precipitated magnesia has been proposed as an antidote. A mixture of chalk and castor oil is said to mechanically envelop the particles of arsenic and render them harmless. The effect of the peroxide of iron in neutralizing the action of arsenious and arsenic acids is seen in the harmless nature of the chalybeate waters of Wattwiller in Alsace, in which arsenic was found by Lassaigne to the amount of 2·8 per cent.—A milder grade of poisoning has resulted from the use of arsenical salts as pigments on wall paper or articles of millinery.

ARSINOË. I. A concubine of Philip, the son of Amyntas, who became the wife of Lagus, a Macedonian general, and the mother of Ptolemy I., king of Egypt. She was said to have been pregnant at the time of her marriage, and her son Ptolemy was generally regarded as the brother of Alexander. II. A daughter of Ptolemy I., king of Egypt, was married to Lysimachus, king of Thrace, who had cast off his former wife Amastris that he might espouse her. Arsinoë, being determined to secure the Thracian sceptre for her own issue, caused her stepson Agathocles, the son of Macris, to be put to death. Lysandra, the widow of Agathocles, fled to Syria with her children, and implored Seleucus to avenge the murder of her husband. A war ensued between the Thracian and Syrian monarchs, in which Lysimachus lost his life (281 B. C.). After this catastrophe Arsinoë sought refuge in Cassandria, a city of Macedonia, where, with her sons by Lysimachus, she remained in security for some time. But Ptolemy Ceraunus, having in 280 assassinated Seleucus and seized the crown of Macedonia, desired to gain Cassandria and get the heirs of Lysimachus into his power; he made an offer of his hand to Arsinoë, who accepted it. No sooner, however, did Ceraunus find himself in possession of the city than he caused the children of Lysimachus to be slain in the presence of their mother. Arsinoë now fled from Cassandria to Samothrace, whence she proceeded to Egypt. Here she was kindly received by her brother Ptolemy Philadelphus, the king, who speedily made her his queen. III. A daughter of Ptolemy Euergetes, wife of her brother Philopator, whom she accompanied to the war against Antiochus the Great in 217 B. C. Some years later a courtier named Philammon put her to death by order of the king; but her murder was subsequently avenged by her friends, who killed Philammon and all his family. She was the mother of Ptolemy Epiphanes by Philopator. IV. A daughter of

Ptolemy Auletes, was proclaimed queen by the Alexandrians after her brother Ptolemy Dionysius had become prisoner to Cæsar (47 B. C.). She subsequently, however, fell into the hands of the conqueror, was carried to Rome, and served to adorn his triumph (46). Her deportment excited the sympathy of the Roman people, and Cæsar permitted her to return to Egypt. In 41 Antony, at the instigation of her sister Cleopatra, had her taken from the temple of Diana at Miletus, whither she had fled for refuge, and put to death.

ARSINOË. **I.** An ancient city of Egypt, capital of the nome or district of Arsinoïtis, W. of the Nile, and not far from Lake Mœris. Ptolemy Philadelphus gave it that name in honor of his favorite sister and queen Arsinoë. Originally, however, it was called Crocodilopolis by the Greeks, because the crocodile there received divine honors from the Egyptians. The ruins of the city may be seen in the vicinity of the modern Medinet el-Fayoom. **II.** An ancient city of Egypt, capital of the Heroöpolite nome, at the N. W. extremity of the Red sea, near the site of the present town of Suez. Ptolemy Philadelphus considerably enlarged and improved it, and gave it its name. Arsinoë was connected with the Nile by the Ptolemæan canal, and was long the great eastern emporium of Egypt. Its revenues belonged to Queen Arsinoë and her successors.

ARSON (Lat. *ardere*, to burn), at common law, the wilful and malicious burning of another's house. House is to be understood in general to mean a dwelling house, and it included at common law all the outhouses that belonged to the dwelling, even though they were not under the same roof or joined to it, as barns and stables containing hay or corn of the owner of the house; and anciently even the burning of a stack of corn was arson. The offence was for a long time and until very lately punished by the English and American law with death. The law on the subject is not now so simple as it once was; for malicious burnings not merely of dwellings, but of churches, warehouses, public buildings, vessels, crops, and many other kinds of property are now made the subjects of express statutory provisions, and usually named arsons; and the subdivisions of the subject are very minute, and the character of the different offences in the different cases is very nicely distinguished. Arson is still used as a word of description, but the statutes do not always employ it; and indeed many of the offences which they refer to were not arsons at common law at all.—The English law as to malicious burnings of all sorts of property has been revised and consolidated in the single act of 24 and 25 Victoria, ch. 97 (1861). It provides that the unlawful and malicious setting fire to any dwelling house, any person being therein, is a felony. It punishes also the burning of churches or other places of divine worship, warehouses, outhouses, farm buildings, or any building used in carrying on trade or manufacture; crops of hay, grass, corn, or grain, or any vegetable produce, whether cut or standing; woods, coppices, heath, gorse, or furze; stacks of corn, grain, or hay; turf, peat, charcoal, coal mines, and other kinds of property; and the penalty in almost all these cases is penal servitude for life or for not less than five years, or imprisonment for any term not exceeding two years, with or without hard labor. The statutes in the United States include not only the burning of dwelling houses, but also the burning of jails, state houses, court houses, school houses, and other public buildings, outhouses and edifices of all descriptions, and in some of the states ships and water craft of all kinds. In many of the states recent statutes of this character also provide for cases of burning or setting fire to buildings with the intent to defraud insurers. In Louisiana and Maine burning a dwelling house may be punished with death; but generally that penalty has been abolished, imprisonment for life or for a shorter term being substituted in its place.—The statutes of two or three of the states will fairly represent the condition of the American law on the subject. In Maine any person who sets fire to the dwelling house of another, or to any building adjoining thereto, or to any building owned by himself or another, with the intent to burn such dwelling house, and it is thereby burned in the night time, shall be punished with death. But if the accused proves to the jury that there was no person lawfully in the dwelling house at the time, or if the offence was committed in the day time, the punishment shall be imprisonment for life. The statute of California provides that every person who shall wilfully and maliciously burn or cause to be burned in the night time any dwelling house in which there shall be at the time any human being, is guilty of arson in the first degree. Such burning of any dwelling house the property of another, in the day time, or such burning either in the day or night of any office, shop, barn, stable, warehouse, stack of grain, or standing crop, the property of any other person, or of any church, school house, state house, or any other public building, or any ship, of the value in any case of $50, is arson in the second degree, and is punishable by imprisonment for not more than ten years and not less than one. If any life is lost in consequence of any such burning, the offender is guilty of murder. Any jail or other edifice usually occupied by persons lodging there at night is deemed the dwelling house of such persons. In Massachusetts the statute enacts that if any person wilfully and maliciously burns the dwelling house of another, or any building adjoining such dwelling house, or sets fire to any building by the burning whereof such dwelling house is burned, he shall suffer imprisonment for life; and the same punishment is inflicted on such burning of certain other buildings and of barns and the like structures within the curtilage of a dwelling house, if it is done in the night. If the commission of arson causes the death of any person, the penalty is death; but without that, it is imprisonment from seven to ten years. In New York, arson in the first degree consists in wilfully setting fire to or burning in the night time a dwelling house in which there shall be at the time some human being; and every house, prison, jail, or other edifice which shall have been usually occupied by persons lodging therein at night shall be deemed a dwelling house. The punishment is imprisonment for life at hard labor. No warehouse, barn, or other outhouse is to be deemed a dwelling house unless it is actually part of one. Arson in the second degree is such burning in the day time of a dwelling house as would be arson in the first degree if done in the night; or the burning in the night time of any building not the subject of arson in the first degree, adjoining to or within the curtilage of a dwelling house, so that such dwelling is endangered.—If a man set fire to a house in the execution of a wicked design to do some other unlawful act—as for example, if, in the burning of his own house to defraud an insurance company, he burns another's—he is guilty of arson. If one sets fire to a hay stack situated so near the house of another that it is likely to carry the fire to that, and it does in fact, he is also guilty. When the house burnt is said to be another's, it is not meant that it shall be the absolute property of another, but only another's house or dwelling for the purpose of habitation or occupation, and a special property is ordinarily sufficient. As to dwelling houses, it has been held that a building designed for that purpose, but not yet finished and never yet occupied, is not a house of which arson may be committed at common law; and the same doctrine was held in the case of a building erected for a dwelling house, but which was not occupied as such at the time of the burning, and had not been for ten months previously. As to the burning, it is not essential to the offence that the house should be entirely consumed. It is enough if the fire takes effect so as to burn, that is, destroy by fire, in any degree.

ARS-SUR-MOSELLE, a town in Alsace-Lorraine, administrative division of Lorraine, formerly belonging to the French department of Moselle, 5 m. S. W. of Metz, at the junction of the Mance with the Moselle; pop. in 1871, 5,380. In and near the town are important iron mines, iron forges, and paper mills. During the investment of Metz by the Germans in 1870, Ars had great strategical importance, as the railway from Nancy to Metz here crosses the Moselle; it was therefore selected as one of the principal depots of provisions for the army of Prince Frederick Charles.

ARTA (anc. *Ambracia*), a town at the southern extremity of Albania, Turkey, near the northern boundary of Greece, on the left bank of the river Arta, and 7 m. N. of the gulf of the same name; pop. about 7,000. It is in the pashalic of Janina, under a bey appointed by the pasha. Woollens, cotton cloth, Russia leather, and clothing are the principal manufactures. Remains of ancient Greek fortifications extend along the river on one side of the town, and portions of them were used in building the castle which is near them. There are also, in another quarter, ruins of two convents, one built by the empress Theodosia in the 9th century, the other of later construction. The river is crossed, opposite the town, by a remarkable bridge 200 yards long, built by the Venetians; it rises rapidly from the low banks to a central point 100 feet above the river. In 1821, during the war of Grecian independence, Arta was besieged and partly occupied by Marco Bozzaris, and was reduced almost to ruins. Before this it was a city of considerable beauty and prosperity, but it has never since recovered, and is now a place of small importance. (See AMBRACIA.)

ARTABANUS, a native of Hyrcania, commander of the bodyguard of Xerxes, whom he assassinated 465 B. C. He persuaded one of the king's sons, Artaxerxes, to kill another, Darius, and then attempted to murder the survivor that he might seize the throne himself. He failed in this attempt and was slain.

ARTABAZUS. **I.** A Persian general, son of Pharnaces, lived in the reign of Xerxes I. He commanded the Parthians and Chorasmians in the expedition of Xerxes against Greece, 480 B. C., and returned to Pallene after the king had recrossed the Hellespont, to punish certain cities which had revolted after the battle of Salamis. He besieged and took Olynthus, killed the inhabitants, and gave their city to Chalcidians. He next laid siege to Potidæa, the walls of which were washed on one side by the sea. The water having for a time receded, however, he marched his troops upon the sand thus left bare between the ocean and the fortifications, and the town seemed lost; when suddenly an unusually high tide overwhelmed nearly all his army, while the Potidæans by a sally defeated the remainder. With the few troops remaining, Artabazus joined Mardonius in Thessaly. He endeavored in vain to dissuade that leader from attempting the battle of Platæa (479 B. C.), and after his defeat led the retreat of 40,000 men from the field. With a remnant of these he reached Asia after many difficulties. **II.** A Persian general in the reigns of Artaxerxes II., Artaxerxes III., and Darius Codomannus. In 362 B. C. he was sent by the first-named king against the rebellious satrap of Cappadocia, Datames, but was defeated by him. Artaxerxes III. made Artabazus satrap of western Asia, but he soon revolted, and, aided by Greek and Theban mercenaries, defeated in two battles the armies sent by the king to punish him. Losing the aid of his allies, however, by the successful schemes of his enemies, he was at last defeated and taken prisoner, but liberated by the exertions of his brothers-in-law, Mentor and Memnon. Unsuccessful in another attempt at rebellion, he was compelled to take refuge with Philip of Macedon. But Mentor, who had joined the side of the king and had been of great assistance in the war against Egypt, secured his pardon about 349. He now returned to Persia, and afterward, in the reign of Darius Codomannus, occupied several positions of trust. His daughters married Alexander, Ptolemy, and Eumenes. He resigned his satrapy in 328.

ARTAXATA (Arm. *Ardashad*), an ancient city on the Araxes, capital of Armenia, 68 m. S. S. E. of Erivan. It was built under the direction of Hannibal while a refugee at the court of Artaxias, after whom it was named. In A. D. 58 it was destroyed with fire by the Roman general Corbulo, but rebuilt by Tiridates, who called it Neronia. In 370 it was taken by the Persians, who partially destroyed it and carried into captivity most of its inhabitants. In 450 a famous council was held here, at which the patriarch Joseph presided.

ARTAXERXES, or **Artexerxes** (in the Hebrew Scriptures *Arta'hshashta* or *Arta'hshasta*), the name of three kings of ancient Persia, signifying, according to Herodotus, "great warrior." **I.** Surnamed Longimanus, was the third son of Xerxes I., and was brought to the Persian throne by the assassination of his father and elder brother Darius (see ARTABANUS) in 465 B. C., and died in 425. Troubles in Bactria, excited by his elder brother Hystaspes, first engaged his attention. Meanwhile Egypt, aided by the Athenians, revolted under Inarus against the Persian yoke. Artaxerxes at length compelled the Athenians to evacuate Egypt, but they continued to struggle on their own account under Cimon, until on the death of the latter (449), Artaxerxes was forced to make a disadvantageous peace. He was succeeded by his son Xerxes II. **II.** Surnamed Mnemon on account of his good memory, succeeded his father Darius II. in 405 or 404 B. C., died about 359. He is chiefly known in history from his contest with his younger brother Cyrus (see CYRUS THE YOUNGER), after whose bloody end in the battle of Cunaxa (401) he was left in quiet possession of the Persian throne. The Lacedæmonians had meanwhile given evidence of a design to take advantage of the Persian complications to attack the empire in the moment of its weakness; and now that the critical time was over, Artaxerxes avenged himself by a successful war against them, which hastened the decline of the Spartan power. Sparta having consented to the humiliating peace of Antalcidas (387), Artaxerxes prosecuted a war against Evagoras of Cyprus, and subsequently against the Cadusii on the shores of the Caspian sea, rendering them tributary; he then turned his forces against revolted Egypt, but failed through the unskilful management of his general, Pharnabazus, and 12 years later renewed the attempt with the same result. He put to death his eldest son, having detected him in a conspiracy, and was succeeded by his third son Ochus. **III.** Ochus, on his accession, assumed the name of Artaxerxes. The principal events of his reign (about 359-338), which was stained by cruelty, were the quelling of a revolt raised by Artabazus, the resubjugation of Egypt, and the pacification of Phœnicia and Cyprus. He was poisoned by his favored eunuch Bagoas.—Besides these, Ardeshir, the founder of the Sassanide dynasty, is called by ancient historians Artaxerxes.

ARTEMIDORUS OF EPHESUS, a Greek geographer, flourished at the end of the 2d and the beginning of the 1st century B. C. He is said to have travelled in Spain and Gaul, and to have made voyages in the Euxine, the Mediterranean, the Red sea, and the Indian ocean, with the object of correcting the errors which former geographers had fallen into in describing them. The result of his travels and observations consisted originally of 11 books. All of these have perished, save the fragments (collected by Hudson) which Strabo, Marcian, and other ancient writers have preserved.

ARTEMIS. See DIANA.

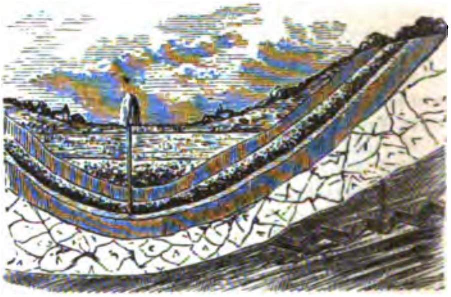
ARTEMISIA. I. A queen of Halicarnassus, in Caria, who, as a vassal of the Persian crown, joined the expedition of that monarch against Greece with a squadron of five ships, and shone by her valor and prudence in the battle of Salamis (480 B. C.). According to a doubtful tradition, she became enamored of a youth of Abydos named Dardanus, who did not reciprocate her affection, whereupon she had his eyes put out. Afterward regretting her cruelty, she consulted an oracle as to how she should make atonement, and in obedience to the mandate of the divinity cast herself into the sea from the Leucadian rock. **II.** The sister, wife, and successor of Mausolus, king of Caria, celebrated for the excessive grief which she manifested at his loss (352 B. C.). She employed the most eloquent rhetoricians of Greece to pronounce panegyrics in his honor, and raised a monument to his memory at Halicarnassus, which was considered one of the seven wonders of the world, and from which the now general term mausoleum is derived. She survived him about two years.

ARTEMISIA, a genus of plants of the order *compositæ*, noted for bitter, tonic, or aromatic properties. *A. absinthium*, or wormwood, is a perennial plant with woody stems in clusters two or three feet high, with long-petioled, irregularly pinnatifid, silvery leaves, and small, clustered, inconspicuous flowers. Its common name is derived from its virtues as an anthelmintic. *A. abrotanum*, or southernwood, is cultivated in gardens for its aromatic foliage, and much used in Europe in beer making. *A. dracunculus*, or tarragon, a native of Siberia, is used in pickles for flavoring. *A. Chinensis* or *moxa* produces a woolly substance on the stems and leaves which is used by the Chinese and Japanese as a moxa by burning it upon parts of the body affected with gout or rheumatism. *A. tridentata* is the common sage bush of the American plains, and is a low irregular shrub, with thick, crooked stems, growing in dry alkaline soils, which unless irrigated will produce little else. Its strong odor may be noticed at some distance away. With greasewood it serves as the principal if not the only fuel on the plains. All artemisias are easily propagated by seeds or divisions of the roots.

ARTEMISIUM, properly a temple of Artemis (Diana), the name of several places in ancient geography. The most important of them was the promontory on the N. coast of Eubœa, off which the Greek ships fought with the fleet of Xerxes, almost simultaneously with the battle of Thermopylæ, in 480 B. C. The success achieved here by the Greeks was soon followed by the great victory at Salamis.

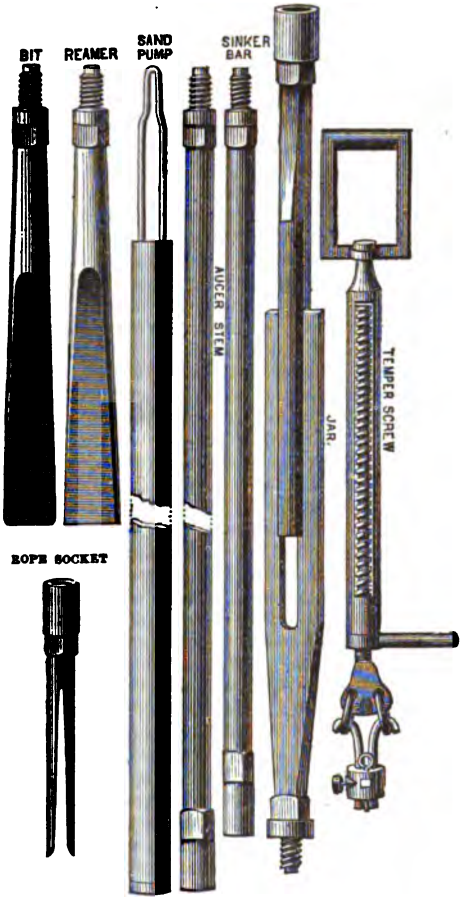
ARTERY (Gr. ἀρτηρία, from ἀήρ, air, and τηρεῖν, to keep), a blood vessel conveying the blood outward from the heart to the organs; so called because the ancients supposed these vessels to contain "spirits" or air. An artery is distinguished from other blood vessels mainly by the thickness and elasticity of its walls. When cut open, therefore, in the dead body, after most of the blood has collected in the great veins and internal organs, the artery does not collapse as a vein would, but stands open, allowing the air to pass into its cavity. It was this circumstance which led the old anatomists to believe that the arteries also contained air during life. They supposed that the air, penetrating the lungs at the moment of inspiration, was partly received by the left ventricle of the heart, and thence distributed by the arteries throughout the body, while the blood was sent out from the right ventricle by the veins. It was not until Galen, in the 2d century, opened the arteries, with some experimental precautions, in the living animal, that it became known that these vessels during life served as conduits for blood and not for air. An artery is composed of three coats, the internal or serous, the middle or fibrous, and the external or cellular. The external coat is the most resisting of the three, and prevents the vessel, under ordinary circumstances, from being distended beyond a certain point. The middle coat is distensible; but, owing to the peculiar nature of the fibres which constitute its substance, it also has the power of elastic reaction, and in the smaller arteries that of muscular contractility. In the larger and medium-sized arteries, the elasticity of their walls reacts upon the blood during the intervals of the heart's pulsation and urges it onward toward the periphery: so that the current of blood in this part of the circulation, though pulsating in character, is yet continuous, or nearly so, and merely increases in velocity with every pulsation of the heart, and diminishes, without ceasing altogether, in the intervals. In the smaller arteries, the muscular fibres of the middle coat, under the varying influence of the nervous system, contract or relax at certain periods; thus increasing or diminishing the resistance of the vessels to the flow of blood, and causing local variations in the circulation of particular parts. When an artery is wounded the blood escapes in jets, coming with greater force at the instant of each pulsation of the heart; and it can be distinguished by this feature from hæmorrhage from the veins, in which the blood escapes in a comparatively feeble but continuous stream. If the wounded artery be of considerable size, it requires to be secured by a ligature in order to stop the flow of blood.

ARTESIAN WELLS, small holes sunk in the earth, through which currents of water, struck at great depths, rise toward the surface, and sometimes flow over; so named from the province of Artois in France (Lat. *Artesium*), in which they have for a long time been in use. Water thus pressed up must have its source in some more elevated lands, and be confined in the strata of rock through which it has percolated; precisely as water is conveyed in pipes below the surface, and pressed up into buildings to a height nearly equal to that at which the pipes commence. Water finds its way down into the earth by flowing into the crevices and chasms of the rocks, and by percolating through the porous strata. In a region of limestone rocks it hollows out for itself its own bed, by dissolving the limestone, and even in this way produces great caves. When forced by the pressure behind, the water is pushed up through any apertures it meets and flows out as a spring or artesian well. There are three conditions essential to the successful boring of an artesian well: 1. A fountain head more elevated than the locality where the boring is to be undertaken. 2. A moderate downward dip of the strata toward the site of the well; a steep or high angle of inclination of dip is unfavorable, as the water is apt to flow away beyond the reach of the boring, which must needs pass at an acute angle through few layers of rock. 3. Alternations of porous and impervious strata beneath the surface soil. It is sometimes the case that the head of water is at so high an elevation, that the column bursts forth from the ground as a fountain,



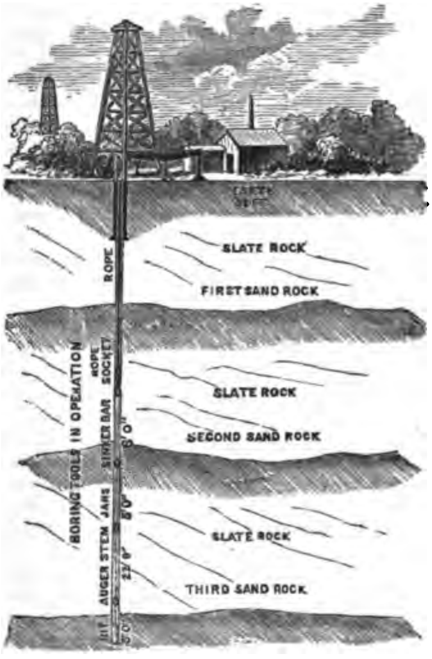
An Artesian Well.

throwing up a continual jet. The principle is precisely that of our artificial fountains. By raising the water above the surface in a pipe, and letting it flow over, convenient water power is obtained; artesian wells are applied to this purpose at many localities in France, the water they supply being found sufficient to run heavy machinery. From the great depth at which the currents of water are reached, their supplies may be regarded as permanent. A well at Aire in Artois, France, which was bored over a century ago, has since then flowed steadily, the water rising 11 ft. above the surface at the rate of 250 gallons a minute; and at Lillers (Pas-de-Calais) one well has flowed steadily since the year 1126. In the vicinity of London it is observed that the height to which the water rises diminishes as the number of wells is increased. In 1838 the supply of water from them was estimated at 6,000,000 gallons daily, and in 1851 at nearly double the amount, and the average annual fall of the height of the water is about 2 ft. But in cases of single wells, the supply of water or the height to which it rises is seldom known to vary. From their depth, also, the water brought up is warmer than that found near the surface. This increase of temperature with the depth takes place at different rates in different places. At Paris, where the mean temperature at the surface is 51° F., the water of the artesian well of Grenelle is 82° from a depth of 1,797 ft., which is about 1° for every 58 ft. deep. At St. Louis, the temperature of the water at 1,515 ft. is 18·18° F. higher than the mean temperature at the surface, making the increase 1° for every 83·3 ft. descent. At Charleston, S. C., the temperature of the water at the surface is 68° F.; at 500 ft. it is 78·5°; at 1,000 ft., 84°; and at 1,106 ft., 88°. The average rate of increase is about 1° for every 52½ ft., as stated by Prof. Hume of the state military academy. The hot springs that flow out to the surface in many parts of the world are natural artesian wells rising from great depths. In Virginia these springs are found along the lines of great faults or breaks in the stratification of the rocks, by which formations usually separated by thousands of feet are brought into contact with each other. Warm waters obtained by artesian wells have been applied to useful purposes connected with manufacturing. They are especially valuable where pure water of a uniformly warm temperature is required. In Würtemberg large manufactories are warmed by the water being sent through them in metallic pipes; a constant temperature of 47° is thus maintained when the temperature without is at zero. Hospitals and greenhouses are also kept warm in the same manner. —The strata of clays, sands, and limestones, which form the tertiary basins of London and Paris, are particularly well arranged for furnishing water by artesian wells. Covering areas of many square miles, the slope of the strata is toward the centre of the basin, and here, at the depth to which these reach, the waters must collect in large quantities. The strata, moreover, are not difficult to penetrate by boring. In these basins are concentrated the greatest number and the most expensive of these wells. The famous Grenelle well in the Paris basin was commenced in 1833, with the expectation of obtaining water at 1,200 or 1,500 ft., in the secondary greensand formation, which underlies the chalk, the uppermost member of this series. For the first 50 ft. the bore was 12 in., which was then reduced to 9 in. for the next 1,050 ft.; a second reduction to 7½ in. was made till the depth of 1,300 ft. was reached, where there was a final decrease to 6 in. At 1,500 ft. the government would have abandoned the enterprise but for the urgent appeals of M. Arago. It was continued till, on Feb. 26, 1841, at the depth of 1,797 ft., the boring rod suddenly penetrated the arch of rock over the subterranean waters, and fell 14 ft. In a few hours the water rose to the surface in an immense volume and with great violence, bringing up sand and mud. To check the supply a vertical pipe was raised many feet into the air, in which the water rises and flows over. The water is perfectly limpid, and flows at the rate of 500,000 gallons in 24 hours. It is used for warming the hospitals at Grenelle, as its temperature is uniformly 82° F. A well very similar to that at Grenelle, though of increased diameter, was begun at Passy, two miles distant, in September, 1854, and finished Sept. 24, 1861. The boring began at a height above the sea of 305·2 ft., and that at Grenelle at 121·3 ft.; the depth is 1,923 ft., and diameter within the tube 2·4 ft. The flow from this well began slowly, but on Sept. 27 had reached over 5,500,000 gallons per day. The yield at the mouth was greatly decreased when raised through a tube 25 ft. high; a like result followed at Grenelle, where the yield was 440 gallons per minute at the surface, but decreased to 135 gallons when forced through a tube 33 ft. high. That these two wells, though two miles apart, drew their supply from the same source, is evident both from their temperature, 82° F. in each, and from the fact that the opening of the Passy well reduced the flow at Grenelle from 135 to 100 gallons per minute, though it is anticipated that by forcing the water at Passy through a still higher tube the yield at Grenelle may be increased. This dependence of several wells upon one source is shown also in the Pennsylvania oil region, where the water from one well, when not pumped out, often finds an exit through the tubes of those adjoining. The work on both the above-mentioned wells was much delayed by accidents. When that at Grenelle was at a depth of 1,254 ft., the drill broke off and fell with 270 ft. of rods to the bottom; 15 months were spent in breaking these and removing the pieces. The tubing in the Passy well was also burst by the external pressure of sand and water, and had to be removed and new tubes inserted, retarding the work for many months. At Kissingen, Bavaria, there is a well 1,878 ft. deep, the last 188 ft. of which passes through rock salt. The water, which flows from it at the rate of 100 cubic feet a minute, contains 8½ per cent. of salt; its temperature is 66° F., and the whole cost of boring was about $88,000.—Artesian wells are of peculiar value upon desert plains, and those vast prairies that rest upon porous limestone formations, through which the surface water finds its way and is lost. In May, 1858, M. Jus, a French engineer, commenced boring for water in the desert of Sahara, and on June 19 a well was sunk, from which there flowed a steady stream of pure water, having a temperature of 61° F., at the rate of 1,000 gallons per minute. Up to the present time (1872) over 75 wells have been bored in that desert, yielding an aggregate of 600,000 gallons an hour. The effect of this abundant supply of water upon the once barren soil of the desert is plainly apparent; two new villages have been built in the midst of former solitudes, 150,000 palm trees have been planted in more than 1,000 new gardens; the oases of Tamelhat, Oum Thior, and Shegga have each their wells yielding from 25 to 1,000 gallons per minute. A promising feature in these wells is that water is reached at a comparatively slight depth, the one in the oasis of Sidi Nached being hardly 200 ft. deep. There is also a well at Bourne, England, which, though but 92 ft. deep, yields 557,000 gallons of pure water per day, and the pressure is sufficient to supply the town and force a stream above the highest roofs. The proprietors of the Continental hotel, Philadelphia, have lately completed a well, 8 inches in diameter and only 200 ft. deep, which supplies them with 50,000 gallons of pure water per day.—The success attending the work of the French engineers in Africa is one of great promise to those who would undertake the irrigation of the rich plains of the Colorado desert; and already a well bored by direction of the Pacific railway company at Point of Rocks, 250 m. N. W. of Denver, in the midst of the alkali district, furnishes abundant water for the engines on that road, the water rising to within 11 ft. of the surface. In 1855 the United States government sent out an expedition, under command of Capt. Pope, for the purpose of boring for water in the Llano Estacado, near the borders of Texas and New Mexico. The first well was sunk at a point 15 m. due E. of the river Pecos, on the 32d parallel of latitude. At the depth of 360 ft. the first stream of water was struck, which rose to the height of 70 ft. in the tubing; at 641 ft. a second stream was struck, which rose 400 ft. Five miles E. of this point a second well was bored to the depth of 860 ft., in which the water rose 750 ft.—Of the artesian wells in the United States, those at St. Louis, Louisville, and Charleston are among the most important, both from their extreme depth and the difficulties attending the sinking. The well at St. Louis was completed at the expense and under the direct supervision of William H. Belcher of that city. An interesting account of its progress is given by A. Litton, M. D., in the "Transactions of the Academy of Science of St. Louis," vol. i., No. 1, 1857. The boring of this well was begun from the bottom of an open well 30 ft. deep in the spring of 1849. The bore to the depth of 219 ft. was 9 in. in diameter, then 5½ in. for 781 ft. further, and continued at 8½ in. till the full depth, 2,199 ft., was reached. At 550 ft., the top of a limestone layer, the water became salty; 200 ft. below this, in a layer of shale, it contained 1⅞ per cent. of salt; and at 965 ft., below a bed of bituminous marl, 2½ per cent. At the depth of 1,179 ft. the hardest rock was encountered, being a bed of chert 62 ft. thick. The work was stopped on March 12, 1854, in silicious and clayey beds belonging to the lower Silurian formation. The water is at present discharged through a 20-inch pipe at the rate of 75 gallons per minute; it is only fit for medicinal purposes, having a strong odor of sulphuretted hydrogen, and containing over 8 per cent. of mineral matter, including 6 per cent. of salt; its temperature is even at 73·4° F. The total cost of this work exceeded $10,000. The well at Louisville, Ky., has a 3-inch bore, and is 2,086 ft. deep. The water flows from it at the rate of 330,000 gallons per day, and with a force equal to 10-horse power. It is perfectly clear, though highly charged with mineral substances, being similar in composition and medical properties to the celebrated Kissingen waters, and the Blue Licks of Kentucky.—Of all the wells sunk in the United States, none is so remarkable for the difficulties encountered and successfully overcome as that at Charleston, S. C. Since 1824 five attempts have been made by the city government to obtain good water by this means. In 1848 the last operation was commenced under the direction of Maj. Welton. The strata first penetrated were alluvial sands, saturated with water, which caused them to run as quicksand. These were shut out by cast-iron tubing of 6 in. diameter, which penetrated the clays and marls of the postpliocene formation, and finally reached the depth of 230 ft., where it rested upon a rock of the eocene formation. From this point down alternations of hard rock and loose sands were met with, the latter causing the same trouble as those above, running in and filling the well, sometimes even to the height of 140 ft. up from the bottom in a single night. When it was found impossible to draw out the sands from these beds, the plan was adopted of shutting them out by tubing. The bore of the lower part, being first enlarged from 8½ to 5½ in., was lined with sheet-iron tubes to the depth of 700 ft. Sand flowing in at 1,020 ft. rendered it necessary to take out the tin tubing, and replace it with heavier tubes of 4 in. diameter and ⅞ in. thick, which screwed one upon another; this was done to the depth of 1,102 ft. The sinking was extended, of 3-inch bore, to 1,250 ft., the last strata being sandstones, sand, and marls, probably of the cretaceous formation. The discharge, 10 ft. above the surface, is about 1,200 gallons an hour. The water is saline, and disagreeable to the taste, but soft. Its temperature is 87°.—In Onarga, Iroquois county, Ill., 85 m. S. of Chicago, there are artesian wells that deserve especial notice, both because of their number (over 200 within a radius of 20 m.), and from the fact that they are all flowing wells, though the average depth does not exceed 70 ft. They are sunk with an auger 6 in. in diameter, and the water vein, a bed of white sand, is reached after boring through 5 ft. of surface soil; 10 to 20 ft. of common sand, 15 to 20 ft. of blue clay, and 20 to 30 ft. of hardpan, a mixture of clay and gravel. The flow, which rises several feet above the surface, varies in amount from 20 to 120 gallons per minute. It has been estimated that the daily yield from these wells is 58,400,000 gallons. It is a fact worthy of note that the district in which they are located is at a level of 92 ft. above that of Lake Michigan, and that the nearest probable fountain head is at least 200 m. distant. This dependence upon a distant source of supply is also demonstrated by the famous Chicago wells. One of these has a surface diameter of 5 in., which is reduced to 4½ on nearing the bottom, at a depth of 711 ft. The other is 5 in. in diameter from top to bottom; the first 42 ft. are lined with an iron tube, which projects 22 ft. above the surface; from this level the water flows at the rate of 432,000 gallons per day, and with a resisting power of from 600 to 800 lbs. The site of both wells is 82 ft. above the level of the lake, and the general character of the surrounding country is flat; whence it is conjectured that they may be fed from the region of the Rock river, 100 m. distant.—Though the geological structure of Manhattan island is exceedingly unfavorable, yet several artesian wells were sunk in the city of New York years ago by Mr. Levi Disbrow. One of the oldest and deepest of these wells is at the United States hotel, known when the well was sunk as Holt's, on Pearl, Fulton, and Water streets. The boring for the first 126 ft. was in stratified sands and blue clay alternating with river mud. At this depth the surface of the rock was struck under a bed of coarse gravel; and below this the shaft was continued in the gneiss rock 500 ft. further. The upper 200 ft. of the well was bored 3 in. in diameter; the remainder was 2½ in. The water for a time was tolerably good, but soon became impregnated with the salt river water, and at last unfit for use. At the corner of Bleecker street and Broadway a well was sunk 448 ft., of 7 in. bore—the first 42 ft. through sands and gravel, and 406 ft. through the hard gneiss rock of the island. The water, as stated by Mr. Disbrow, rose within 30 ft. of the surface, to the amount of 120,000 gallons in 24 hours. At the dry dock, 11th street, East river, the rock, met with at 180 ft., was penetrated 200 ft. further. Many other wells of this nature have been sunk in and near the city, but with no features of particular interest.—In considering the methods of boring artesian wells, and examining the implements now used, it is interesting to note the similarity between these and those employed by inhabitants of China centuries ago. The missionary Imbert stated in 1827 that in the province of Ou-Tong-Kiao, in a district 10 leagues long and 4 wide, these wells may be counted by "tens of thousands," sunk at very remote periods for the salt water and bituminous matters which they emit. These products are met with at the depth of nearly 1,800 ft., and some of the wells that had lost them have been carried down even to 3,000 ft. From this enormous depth currents of carburetted hydrogen come up in such quantity that it is used to furnish heat for evaporating the salt water. (The gas from the Pennsylvania oil wells is often burned under the steam boilers.) Instead of using rods to sink their wells, the Chinese suspend the cutting drill, which is attached to a heavy metal rod 6 ft. long and 4 in. in diameter, by a rope or chain, which passes over a wheel. Around the drill is a cylindrical chamber, which by means of simple valves takes up and holds the broken fragments. As the rope is raised and dropped, it gives by its torsion a turn to the drill, causing it to vary its position at each stroke. When the cylinder requires to be discharged, it is easily wound out by a windlass or horse-whim. The rope is protected from wear by knobs of wood attached to it at intervals. This principle has been successfully applied in Germany to sinking holes for ventilating mines; with large drills 18 in. in diameter a hole of this size has been carried down several hundred feet.—The demand for improved methods of sinking these wells which the opening of the Pennsylvania oil region created, has resulted in the introduction of many ingenious labor-saving appliances, though the attention of the oil men has been chiefly directed toward the devising of methods by which the boring tools may be safely and quickly removed in case of accident. A general description of the processes of boring, tubing, and pumping, as practised in western Pennsylvania, may best serve to illustrate the latest advances made in the methods of sinking artesian wells. Directly over the site of the proposed well a wooden derrick or open tower is erected, 14 to 16 ft. square at the base and 30 to 60 ft. high, the four corner posts converging so as to form a square at the top 2½ ft. in diameter, upon which rests a heavy framework for the reception of the pulley over which the drill rope is to play. Near the bottom of the derrick, and in range with the band wheel from which the power is derived, is a shaft of timber 6 or 8 ft. long, and about 8 in. in diameter, mounted on journals,



Boring Tools.

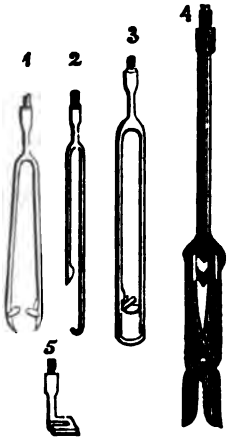
and similar in character to the common hoisting windlass. Upon each end of this shaft is driven a large pulley called the bull wheel; between these, upon the main shaft, the drill rope, a cable of from 1¼ to 1¾ in. in diameter, is coiled, the outer end passing from it over the pulley on the top of the derrick, and attached to the drilling tools. When these are to be lowered or withdrawn, it is done by means of power applied to the bull wheel. In localities where the rock is some distance below the surface, it is customary to drive down, by the aid of a suitable weight and guideway, a heavy metal pipe, called the drive pipe; this is usually of cast iron, from 6 to 8 in. in diameter and an inch in thickness; it is driven in sections of 10 ft., and great care is needed that it be not bent or deflected, since it is to guide the drilling tools. The engine is so placed that its drive or balance wheel shall be from 20 to 25 ft. from the centre of the derrick, and at one half this distance is planted the sampson post, a heavy hewn timber from 12 to 18 in. square and 12 ft. high, the top of which is fitted to receive the working beam. This working or walking beam transmits and applies the power to the drills; it is of wood, 12 or 16 in. square, and of such a length that when balanced upon the sampson post one end may stand directly over and connect, by means of a connecting rod, with a crank attached to the shaft of the drive wheel; by the revolution of this crank, which has a radius of about 20 in., a reciprocating movement is given to the further end of the working beam; on this is bolted an iron joint, to which may be attached the temper screw when drilling, or the sucker rods when pumping. The drilling tools consist of centre bits, reamers, an auger stem, jar, and sinker bar, with a socket for attaching this last to the drill rope. The centre bit is of 2½-inch wrought iron, 3½ ft. long, and having a wedge-shaped cutting edge of steel, 3½ to 6 in. on the face. The reamer, which follows this and serves to enlarge and trim out the hole, is very similar in shape, though about an inch broader on the face, which is also more blunt; the average weight of each is about 75 lbs. The auger stem, into which bits, reamers, and dislodging tools are screwed, is a wrought-iron bar about 20 ft. long. The sinker bar, a heavy rod of iron 10 ft. long, serves to increase the force of the blow; it is separated from the auger stem by an ingenious contrivance called a jar, consisting of two links or loops of iron or steel, which slide in upon each other when the drill strikes bottom, thus, by a quick blow upon the top of the auger stem, increasing the effect of the fall; and on the upward movement the sudden jerk or jar serves to loosen the tools, in case they become wedged. When connected, these tools weigh from 800 to 1,600 lbs., as the hardness of the rock requires. The drill rope is attached to the working beam by means of a temper screw, suspended from it and made fast to the rope by a screw clamp. This temper screw is about 8 ft. long, and is made with a coarse thread that works in a thin frame. At the lower end of this screw is a wheel, by which it is let down after each stroke, whereby the tension is regulated and the drill properly guided. The tools are lifted and dropped by the rocking motion of the working beam, and lowered or withdrawn by aid of the bull wheel and shaft. The sediment and battered rock is removed by means of a sand pump, which is a heavy metal tube, slightly smaller than the well bore, and about 6 ft. long, with the lower end closed by a simple valve opening upward; this is lowered and withdrawn by a light rope, and the wellman by an examination of its contents is informed of the progress and prospects of his work. The pump is used after each drilling of 6 to 12 in. The tubing of a well consists in lowering down a heavy iron pipe in sections, the joints of which are flush both inside and out. At the lower end of the first section lowered down is a simple ball-valve pump, the piston



Boring Tools in Operation—Pennsylvania Oil Region.

Simplest Boring Apparatus.

of which is connected with the working beam by jointed poles or metal rods. When it is desirable to exclude all water from above a given point, it is effected by binding around the tubing a leather bag of flax seed before driving it down; the swelling of this closes the space between the main wall and the tube. The steam engines in use in western Pennsylvania range from 6 to 20 horse power, one of 8 horse power being sufficient to bore a well 900 ft. deep. Artesian wells have been sunk, though very slowly, by the aid of two men and an old-fashioned spring pole.—Among the accidents liable to occur in the boring of artesian wells, are the breaking of the drills, or their detachment from the auger stem, and the loss of the sand pump or the whole boring gear by the wearing away of the drill rope. At times the drill enters what is known as a mud vein, a thin stratum of mud or quicksand, which often flows in so rapidly as to enclose and bury the drilling tools. There are many ingenious contrivances for the removal of these obstructions, and the forms of several of the less complex are shown in the cut. Fig. 1 is designed chiefly for removing detached or broken pipe or rods. It is lowered down the well bore until the rod passes up above the ends of the two arms, when by an upward movement the two catches, being pressed forward by springs, take hold of the rod and grasp it the more firmly the greater the resistance. Fig. 2 is of service mainly in removing a detached drill or reamer; the shorter arm acts as a guide, while the hook at the end of the larger one passes below and takes hold of the lower edge of the drill. Figs. 3 and 5 are also designed for removing broken rods. In 3 the rod passes through the metal cylinder, and is prevented from falling back by the drop-catch and spring. Fig. 5 consists of an angular claw placed at right angles to the rod by which it is lowered; this is twisted under the shoulder of the rod, thus securing it as in a wrench. Fig. 4 is the ordinary lazy tongs, and is of very general service, as its construction indicates.—



Tools for Extracting Obstructions.

In addition to the contrivances above mentioned, the French engineers have introduced certain improved drills, pumps, &c. The drill invented by M. Goulet-Collet consists of a cylinder of sheet iron 6 ft. long, suspended by a chain, and armed at its lower end with an annular cutting head of steel, in which two knives or chisels are inserted at right angles across the opening. These chisels serve to cut the rock, which when finely divided rises with the water through the openings; these may be provided with valves, the instrument thus serving the double purpose of drill and pump. The method of boring by means of the diamond drill is essentially different from that described above. (See Boring.) When a well fails to yield a fair amount of oil or water, an increase in the flow is often effected by means of the Roberts torpedo. This is a thin water-tight cylinder of metal or paper, 4 to 6 ft. long and 2 or 3 in. in diameter, charged with powder, guncotton, or nitroglycerine. It is lowered to the bottom of the well, or to a depth that will bring it opposite the desired stratum, and the well then flooded. The charge is exploded by a cap or electric spark, and the explosion often clears away the obstruction from the oil or water vein. Wells yielding only 5 bbls. of oil per day have been increased by this means to 75 or 100 bbls.—Negative artesian wells are those which serve to convey away surface waters into some absorbing stratum. They are of service about manufactories from which large quantities of impure liquids are discharged, the flow of which upon the surface would prove a nuisance.

ARTEVELDE. I. Jacob van, a citizen and popular leader of Ghent, and for a time almost ruler of Flanders, born about 1300, killed in a popular insurrection, July 17, 1345. He was of noble family, but caused himself to be enrolled in the guild of brewers as a means of gaining the favor of the people. By the generous use of his great wealth, and by his sympathy with the popular cause, he soon acquired a wide influence, was chosen leader of many other guilds besides his own, and won the universal confidence of the people. War was at this time raging between England and France. Count Louis I. of Flanders and nearly all the Flemish nobility were openly on the side of the latter, while the sympathies of the people of Ghent and the great Flemish commercial cities were entirely with the English. Count Louis had made himself most unpopular with his subjects by his tyrannous acts, while Artevelde had attained such power that he acted with entire independence of his sovereign. Thus, when a crisis was brought about by a message from Edward III. of England to the Flemings, asking their alliance, Artevelde took it upon himself to make a treaty with him, in which he was sustained by the citizens of Ghent. Aided by the English, the popular leader forced Bruges and Ypres to join in his treaty with Edward, compelled the count to retire into France, and was himself proclaimed leader or governor (*ruwaert*). He now assumed complete control of Flanders, removed the officials appointed by Count Louis, and when in 1338 the latter returned to Ghent to seek a reconciliation with the citizens, he made him prisoner, and forced him (December, 1339) to agree to the English alliance. Soon afterward Count Louis again returned to France. Artevelde retained almost absolute power in Flanders for nine years, until, by an injudicious project for proclaiming the prince of Wales (the Black Prince) governor of the country, he lost the popular confidence. Feuds followed between the different guilds, which he no longer controlled; the chief of the weavers, Gerard Denys, aspired to be his rival; and finally a battle was fought in the market place, between the weavers and other guilds, in which the former were victorious. Artevelde now thought himself in danger, and introduced a body of English troops into his house; this enraged the people, who rose against him and killed him in his own dwelling. **II. Philip van,** son of the preceding, and like him a popular leader and governor, born about 1340, died in battle, Nov. 27, 1382. During his youth he took no part in public affairs; but when the citizens of Ghent revolted against Louis II., the son and successor of his father's enemy, his name and associations brought him into immediate prominence, and he was chosen ruwaert in 1381. One of his first acts was to bring to execution twelve of those who had assisted in the murder of his father. Count Louis had in the mean time succeeded in so completely cutting off supplies from Ghent that he had reduced the city to great want. But the citizens endured the suffering bravely, two who proposed surrender being put to death, and Artevelde resolved upon a sally against the count, who had his headquarters at Bruges. With 6,000 troops he encountered Louis near that city, defeated him with great slaughter, and took and plundered the city; upon this victory, the other Flemish towns, except Oudenarde, which he unsuccessfully besieged, submitted. The French king, Charles VI., now sent an army to the assistance of Count Louis. It entered Flanders in November, 1382, and on the 27th met and routed the troops of Artevelde, killing an immense number. Artevelde's body was found among the dead, and hung by the victors to a tree.

ARTHRITIS (Gr. *ἀρθρῑτις*, belonging to the joints, from *ἄρθρον*, a joint), inflammation of the joints, of which there are three kinds, traumatic arthritis, rheumatic arthritis, and gouty inflammation of the joints. For the two latter varieties, see GOUT, and RHEUMATISM. Traumatic arthritis is a frequent complication arising from wounds or bruises, contusions, and surgical operations in or near the articulations. Acute inflammation of the articulation sometimes occurs also, without external cause, from the absorption of pus or morbid matter within the system. Women suffering from recent childbirth, or persons afflicted with phlebitis, blennorrhagia, or purulent infection, are liable to suffer from arthritis. Blows, falls, sprains, violent distortion of a joint, fractures, and wounds made by sharp instruments, may all produce acute inflammation of the joints. All the parts of the joint may be involved, or some of the external or internal tissues only; for the intensity of the inflammation is much greater when the capsule of the joint is lacerated and admits the air. During the first day or two the case may seem very simple and without danger to the patient; but often on the third or the fourth day, or even later, the symptoms become more severe, and the pain excessive. Traumatic arthritis is sometimes so severe as to derange the general health profoundly, causing delirium and convulsions; the skin is burning hot, the tongue is red, bile is vomited, and the patient suffers much from bodily pain and mental anxiety. Suppuration is the usual termination of this kind of inflammation. When traumatic arthritis is superficial, it is easily cured; but when deeply seated and admitting air into the joint, it is a serious disease. The proper treatment consists of cloths and compresses steeped in cold water, and placed around the inflamed parts; rest for the whole body, and particularly for the implicated limb; cooling diet, with appropriate sedatives and other medicines. Cupping and leeching are sometimes useful; and where suppuration has commenced, it is commonly more prudent to allow it to form its own opening for evacuation.

ARTHUR, a hero of British mythology, believed by many to have been identical with an actual sovereign in England in the 6th century. Nennius, the most ancient Cymric poetry, the Triads, and the Welsh bards Llywarch, Hen, and Taliesin, mention Arthur, a chief of the Britons, fighting against the Saxons under Cerdic. Based upon their statements, many attempts have been made to prove the actual existence of a great sovereign corresponding with the Arthur of romance. It seems probable that a prince called Arthur ruled in Britain about 525, fought many battles with the Saxons, was killed by his nephew, and buried at Glastonbury, where his tomb is said to have been found in the reign of Henry II. But late authorities (among them George W. Cox, who makes a searching inquiry into the story) may be said to have proved that the Arthur of romance is a purely mythical personage. Mr. Cox points out the resemblance between the legends of Arthur and the myths of other ancient nations, and by the aid of etymology shows that many of these were merely allegories derived from natural phenomena.—The Arthur of the famous legend was the son of Uther Pendragon and Igerne of Cornwall, whom Uther, by the enchantments of the sage Merlin, was enabled to visit in the guise of her husband Gorlois. His high descent was concealed, and he was brought up by a faithful knight, who treated him as his own son until after the death of Uther, when Arthur, going with his foster brother to London, gave evidence there of his royal birth by drawing from the stone in which it was imbedded a sword with this inscription: "Whoso pulleth this sword out of this stone . . . is rightwise born king of all England." He was crowned, and after reigning for several years he married Guinevere, "the fairest woman in the land." With her, as a part of her dower, he acquired the enchanted round table which had once belonged to his father Uther. About this he formed the famous circle of knights of the round table, and with these began the brilliant court, the wonderful series of exploits at home and abroad, and the countless adventures of various heroes, celebrated in the legends preserved in the Chronicles of Geoffrey of Monmouth and elsewhere. The story of Arthur ends with the wound given him by his false nephew Modred, at a battle near Salisbury; after which the king was borne away by the fairies to be cured by them in the valley of Avalon, whence, said the legend, he should some time come again to lead the British Celts against the Saxons.—The legends of Arthur and his knights have been the subject of numberless poems in almost every modern language. Tennyson, more than all others, has added by his "Idyls of the King," "Morte d'Arthur," and other poems, to the beauty of the legends as we know them. For discussions as to the actual existence of Arthur, see, for support of the theory, "England under the Anglo-Saxon Kings," translated from the German of Dr. J. M. Lappenberg by B. Thorpe (London, new ed., 1857); against it, the introduction to Cox's "Popular Romances of the Middle Ages" (London, 1871); for history of the old romances treating of Arthur, the appendix to the "History of the Anglo-Saxons," by Sharon Turner (London, 7th ed., 1852); for a good rendering of the legends, the work of Cox, just cited.

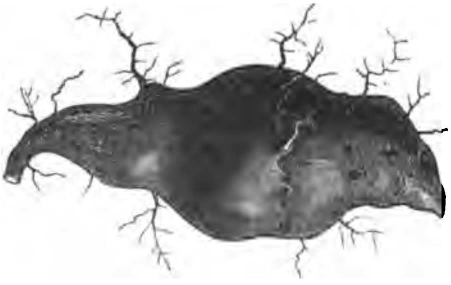
ARTHUR, Chester Alan. See supplement.

ARTHUR, Timothy Shay, an American author, born near Newburgh, Orange county, N. Y., in 1809. He was about eight years old when his parents removed to Baltimore. He was apprenticed to a trade, was for several years a clerk, and in 1838 visited the west as agent of a banking company. Upon his return to Baltimore he became connected with a newspaper, and began to publish a series of short novels. Since 1841 he has resided in Philadelphia, and for many years edited and published a weekly journal and a monthly magazine. His productions are numerous, consisting chiefly of works of fiction of a domestic character, written with a moral aim, several of them relating especially to the subject of temperance.

ARTHUR, William, an Irish Wesleyan clergyman and author, born in the county of Antrim in 1819. After a thorough classical training and special studies in Italian literature, he entered the Wesleyan theological institution near London, and upon graduating was appointed missionary to India; but after three years of successful labor, being threatened with total blindness, he was obliged to return to England. Subsequently he was appointed secretary of the missionary society of the Wesleyan church, and soon afterward was elected president of the British conference. In 1867 he was chosen principal of the Wesleyan college, Belfast, Ireland. In 1870 he was recalled to England, and made honorary secretary of the missionary society of the Wesleyan church. Apart from many valuable contributions to educational and missionary literature, Mr. Arthur is best known by the following works: "Personal Reminiscences of a Mission to the Mysore," "The Successful Merchant—a Memoir," "The Tongue of Fire," and "State in Transition."

ARTICHOKE, an edible plant of the genus *cynara*, order *compositæ*, resembling a large thistle, known in the south of Europe as early as 1548. *C. scolymus* and its variety *C. hortensis* are the green and globe artichokes of the garden. The portion eaten is the under side of the head before the flower opens. The whole head is removed and boiled, the leaves laid aside, and the bottom eaten, dipped in butter with a little pepper and salt. A sauce made of butter and spices is frequently used. The French sometimes gather the heads when not larger round than a dollar, and eat the lower end of the leaves raw, dipping them in oil, pepper, and vinegar. The globe variety is generally preferred by gardeners. Artichoke seed should be sown in a gentle hot-bed or warm open border as early in the spring as frost will permit. The plants should be set four feet apart each way, in a stony soil, well prepared. They will bear heads the succeeding year. Some gardeners place six plants in a hill, making the hills six feet apart. Artichokes may be raised from sets or shoots, which should be removed and carefully transplanted. As often as heads are removed from a plant, it should be broken down to encourage the growth of new shoots. In autumn all plants should receive a good supply of earth or litter. Stable dung is too heating, and should never be employed. In the spring remove the autumn covering and take away all offsets except two or three of the best. During the first season the young plants of the previous year will produce heads from June to October. In succeeding years they will give heads from May to June or July. To have them the whole season, an annual plantation must be made. The flowers of the artichoke have the property of rennet in curdling milk. The French use the heads of the second crop of artichokes when dried, baked in meat pies with mushrooms. Artichoke heads are sometimes made to grow larger by tying a ligature tightly around the stem three inches below each.—The **Jerusalem Artichoke** (*helianthus tuberosus*, order *compositæ*) is not a true artichoke, but the root of a species of sunflower. In Italian it is named *girasole*, or sunflower, which in English is corrupted into Jerusalem. In America it is sometimes called Canada potato or Virginia potato. It was well known in England as an edible root about the year 1620, having been brought from Brazil. The tubers are good for swine and cattle. They are capable of resisting the severest degree of cold when left in the soil the whole winter; being lifted in spring, they form excellent food for stock. The Jerusalem artichoke may be raised in all classes of soil, and when grown in light sands and gravels, swine are allowed to dig the tubers for themselves. It is difficult to eradicate this plant from the soil, and it is seldom entirely removed where once rooted in a rich soil. The tops cured in autumn form an excellent hay, yielding five or six tons per acre. Sandy soil of fair quality is said to yield from 1,200 to 1,500 bushels per acre. They are not quite as nutritious as the potato, containing 72·2 per cent. of water, being about 4 per cent. more than is contained in the potato. Cordage is sometimes made out of the tops, and in the south of Europe a kind of coarse cloth is manufactured from them.

Globe Artichoke.



Tuber of Jerusalem Artichoke.

ARTICULATA, the third great division of the animal kingdom in the classification of Cuvier, and by him subdivided into four classes. Other naturalists have added four more, making the following eight classes, of which the first four are those of Cuvier:

1. Annelida, as leeches, earthworms, &c.
2. Crustacea, as crabs, lobsters, prawn, shrimps, &c.
3. Arachnida, as spiders, scorpions, mites, &c.
4. Insecta, as beetles, flies, butterflies, &c.
5. Myriopoda, as centipedes.
6. Cirrhopoda, as barnacles and sea acorns.
7. Rotifera, wheel-shaped animalcules, aquatic.
8. Entozoa—lowest of the worms—parasites upon or within other animals.

Each of these classes will be found treated under its own name. The articulata may properly be ranked, upon the whole, as higher in the animal scale than the mollusca, although, as in this division, some species may be found less highly organized than are some of the radiata, the fourth division of the series; for the articulata possess a high development of the locomotive organs, in which the mollusca are particularly deficient. The nervous system also is so organized that it presents a sufficient characteristic for designating the group; and the name *homogangliata* has been proposed by Prof. Owen as a substitute for that of *articulata*, this having reference only to the external conformation of the body in transverse rings, which may be of the soft skin or integument, or else serve, in the form of a hard shell, as an external skeleton, to which the muscles are attached. This arrangement of the nerves is a chain of knots or ganglia, symmetrically disposed upon a double cord, which passes through the ventral region of the body, and from each ganglion nervous filaments pass off to the different segments of the body. A nervous ring from the anterior pair of ganglia encircles the œsophagus. Filaments connect this with the organs of the senses, and the œsophageal ganglia have hence been regarded as analogous to the brain in the higher orders. They are more and more concentrated as the animal occupies a more elevated position in the division, the members of the body being at the same time brought into closer connection. The symmetrical arrangement of the nerves suggests that of the members also; and the limbs are found arranged in pairs, in the centipedes each pair proceeding from one of the articulations of the body. In the higher classes, as the crustacea, the same symmetry of pairs of limbs is perceived, and the connection of each pair with a segment of the body, even when the thorax, or body, needing no flexibility for locomotive purposes, has its rings very obscurely defined. The lower groups contain the greater number of articulations or rings, and these are usually soft, upon an elongated body, furnished in most cases with no true limbs. Progressive motion is obtained by the bending of the flexible body in one and another direction, the muscles which effect this occupying a large portion of the body which in other animals is usually devoted more to the organs of nutrition and digestion. These in the articulata are not so elaborate as in the mollusca. The organs for respiration are much more highly organized, particularly in the insecta. In the air-breathing species the blood is aërated by being exposed to the action of the air introduced within the body, the fluid being distributed in cavities or tubes permeable to the air; the former appear to be analogous to lungs. In the articulata is found the greatest diversity of forms and habits of life. The largest animals of the division are the lobsters and crabs of the crustacea; the rest are, for the most part, of small size, many of them so minute as to pass unnoticed in the watery elements in which they abound.

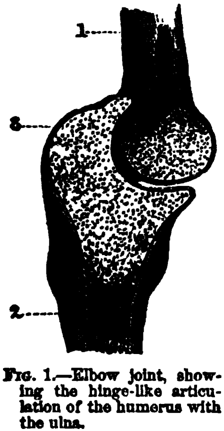


FIG. 1.—Elbow joint, showing the hinge-like articulation of the humerus with the ulna.
1. Lower extremity of the humerus, or bone of the upper arm.
2, 3. Upper extremity of the ulna, or bone of the forearm.

ARTICULATION, a term in anatomy, denoting the various modes of union between the bones of the skeleton. We may class articulations under three general heads, viz., movable joints, immovable joints, and joints of a mixed order, being somewhat movable, without much relative displacement of the contiguous surfaces. Movable joints are the most complex and various in structure; immovable, the most simple. Movable joints are common in the limbs, and the articulation of the lower jaw with the skull; immovable joints are common in the head and face and lower portion of the trunk; mixed forms of articulation are common in the spinal column and the upper portions of the trunk. The hinge joints of the elbows and the knees, allowing free movements in one plane only, form one order of the movable class; the ball-and-socket joints of the hip and shoulder, allowing free movements in a circular direction, form a second order of the movable class; and different combinations of these two orders, as seen in the articulations of the lower jaw with the skull, of the hands and feet with the arms and legs at the wrists and the ankles, and also of the bones of the hands and fingers, feet, and toes, form a third order of the movable class. The elbow joint, in fact, is of a compound order, being of the hinge-joint form with reference to the cubital movement of the forearm on the arm, and of the ball-and-socket form with reference to the radial movement of the forearm on the arm, in what are termed the supination and pronation of the hand and arm.—The class of immovable joints may also be subdivided into different orders and varieties. In the sacrum and the pelvis many bones which are distinct at first literally grow together in some subjects, so as to efface all trace of original separation, while in others traces remain visible of former separation. In the cranium and the face there are numerous modes of junction between bones connected by immovable articulation. The most prominent order of this class in the cranium is the serrated suture, the firmness of the union being increased by alternate notches or indentations and projections like the teeth of a saw formed on the edges of the bones, the teeth of the one being adapted to the indentations of the other. In this manner the bones of the skull unite at the top of the head and in the centre of the forehead. In other cases bevelled edges overlap each other, and in this manner the temporal bones are joined to the parietal bones of the skull. Another form of fixed articulation is the ridge-and-groove, a ridge being formed on the edge of one bone and a grooved fissure in another to receive it. By this means the bony part of the septum of the nose is inserted into the floor of the nasal cavity to divide the nostrils, and thus form a double cavity by means of a partition wall.—The mixed class of articulations contains many varieties of adaptation. The mode in which ribs are attached to the spinal column behind and to the sternum in front forms one simple order of the mixed class; the mode in which the vertebræ are connected with each other in the spinal column, another, more complex; and the mode in which the slightly yielding portions of the pelvic articulations are connected, a third and simple order of this class.—The movable articulations, being the most complex in form and structure, will give the best idea of the various elements of an articulation; and the ball-and-socket joint, being the most simple of this kind, will serve the purpose of a simple illustration. In the hip joint we have a kind of ball, or rounded surface, at the head of the thigh bone, which hemispherical surface is capped with a thin layer of cartilage, somewhat elastic in structure, and exceedingly smooth on its external surface. In the bones of the pelvis a socket is formed, called the acetabulum, exactly shaped for the reception of this hemispherical head of the thigh bone, and this socket is lined with a thin layer of dense, elastic, and polished cartilage, so that in the joint two polished surfaces meet together and allow free movement, with the least possible amount of friction; but to lessen the effect of friction, and facilitate the movements of these surfaces one upon the other, a delicate membrane surrounds the external borders of the articular cartilages, and secretes a viscid fluid which lubricates the surfaces, preventing actual contact and destructive friction of the cartilaginous tissues. This lubricating fluid is technically called synovia, and the secreting membrane the synovial sac or synovial membrane. To prevent the dislocation of the joint, a strong rope of fibrous tissue, very similar in structure to that part of an oyster which cannot easily be removed from the shell, connects the top of the ball with the bottom of the socket, in a somewhat loose but very strongly attached manner. This is termed the round ligament; it is very short and very strong. The outer surfaces of the ball and socket (not in the socket, but outside) are connected by means of a strong ligamentous band of fibrous tissue, loosely connecting the head of the thigh bone with the pelvic bones, on the outer rim of the socket, but strongly attached to the bones themselves, which it binds together firmly, while permitting a considerable freedom of motion or rotation in the joint. In other joints of the movable class the outer ligaments are not always continuous and circular bands as in this case, but take the form of distinct fibrous ropes, strongly attached to the bones, and forming strong, flexible bands, as strips of leather nailed to the body and the lid of a box serve as ligaments where there are no hinges. Thin, dense, elastic layers of cartilage cap the articular edges and surfaces of bones in the great majority of joints; strong, fibrous, and flexible ligaments connect the bones externally; and, where the joints are very movable, synovial membranes surround the articulating surfaces, and the synovia which they secrete lubricates the surfaces exposed to contact, friction, and mobility.

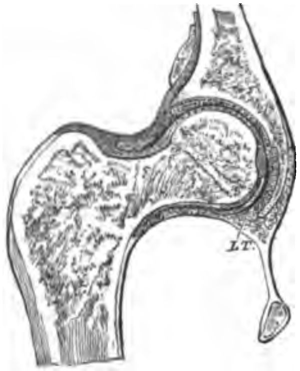


FIG. 2.—A section of the hip joint taken through the acetabulum and the middle of the head and neck of the thigh bone. —*L. T.* Ligamentum teres, or round ligament.

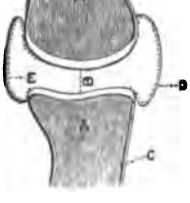


FIG. 3.—Diagram of a longitudinal section of an articulation. A. Bones. B. Articular cartilage. C. Periosteum. D, E. Synovial membrane.

ARTIGAS, José, a South American general, born at Montevideo, in Uruguay, in 1755, died in Paraguay in 1851 (not, as often stated, about 1826). The son of a wealthy landed proprietor, he led for a time an adventurous life as a *gaucho*, and then served as captain in the light cavalry of the provinces, but on account of some difficulty with the governor passed in 1811 into the service of the junta of Buenos Ayres, then in insurrection against Spain. At the head of a band of gauchos, he defeated the Spaniards in several encounters, and vigorously supported the republican army which besieged the Portuguese troops from Brazil who then occupied Montevideo. Passionate and scheming, he soon acted independently, and finally detached his men from the besieging army; whereupon Posadas, director of the junta, outlawed him and set a price upon his head. But the gauchos flocked to his standard, and Artigas, having defeated the troops sent against him, obliged his enemies to cede to him the whole of Uruguay (1814). He next compelled the Portuguese to abandon their attempt to regain possession of Montevideo, which had surrendered. He now acted as dictator in his native country, and made a vigorous but unsuccessful attempt against Buenos Ayres (1815). After various contests he was twice defeated, in 1819 and 1820, and compelled to flee to Paraguay, where Dr. Francia, the dictator, banished him to Candelaria. Here the former gaucho chief devoted himself to husbandry, and to the care of the sick and needy, and attained a patriarchal age.

ARTILLERY, the cannon employed in war, and the troops organized to use them. The Chinese as early as A. D. 969, under the emperor Tai-tsu, tied rockets to their arrows to propel them to greater distances, as well as for incendiary purposes. During the first half of the 13th century all the resources of their military art became known to the Arabs through the Mongol conquerors of China. The idea of the application of gunpowder to projectiles, though said to have been accidentally suggested to Berthold Schwarz about 1330, is probably due to the Moors or Arabs of northern Africa, who had artillery at Cordova as early as 1280. The Spaniards learned its use from them, Ferdinand IV. of Castile taking Gibraltar with cannon in 1309, and guns being employed soon after at the sieges of Baza, Martos, and Alicante. A knowledge of artil-

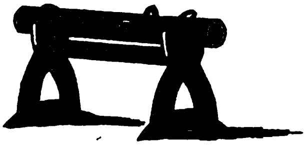


Fig. 1.—Early English Cannon, time of Battle of Crécy.

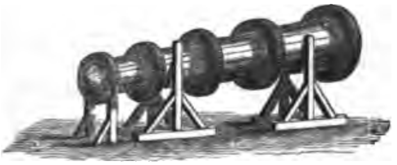


Fig. 2.—Bombard.

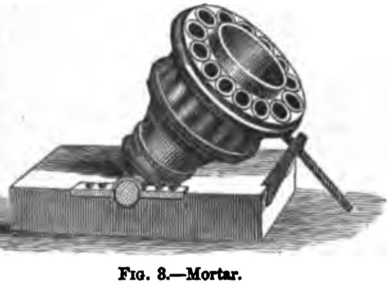


Fig. 3.—Mortar.

lery soon extended throughout Europe, the French having cannon at the siege of Puy Guillaume in 1338, and the English three small guns at the battle of Crécy in 1346. Cannon are not referred to in the Hindoo books before the beginning of the 13th century; but during the next hundred years their use became general throughout India, and upon the landing of the Portuguese in 1498 they found the natives their equals in the construction and use of firearms.—The European as well as the Asiatic cannon of the 14th century were made of longitudinal bars of iron bound together by hoops, being shaped externally and internally like an apothecary's mortar; they were called bombards, vases, or mortars, were very heavy, and projected stone balls at high angles, doing but little execution; when put in position they were fired from a timber stock or framework, gun carriages being unknown. These unwieldy machines, some of which were breech-loaders, were used not only in siege operations, but in the field and even on shipboard. To give a more accurate direction to the projectile, the bore was afterward made cylindrical and terminated in a very narrow and deep chamber, the object being to increase the effect of the powder by retarding the escape of the gas before it acted upon the ball. During the first half of the 15th century bombards were improved upon and made very large; in France one weighed 10,000 lbs. with a 400-lb. projectile, a second 36,000 lbs. with a projectile of 900 lbs.; they were generally made of several pieces screwed together, and could not be moved unless taken apart. Mortars only differed from bombards in length, but were very rare. The other cannon of the day were *veuglaires*, breech-loaders of less size and power than bombards; *crapeaudeaux*, still smaller, weighing from 100 to 150 lbs.; and *culverins*, the smallest of all, unchambered and using projectiles of lead. To facilitate pointing and firing, two or more of the smaller guns were occasionally mounted on a two-wheeled wagon, the whole being called a *ribaudequin*, or organ gun, the earliest form of the modern mitrailleuse. Artillery was very much used during the French war of independence against the English. At the defence of Orleans in 1428 Joan of Arc herself pointed the guns; and as the struggle went on the brothers Jean and Gaspard Bureau became very successful in the conduct of siege operations, being the first to make regular approaches and place guns in breaching batteries under cover of casks filled with earth, instead of merely hiding them behind wooden screens. The marked progress made by artillery had the effect of everywhere increasing the power of the crown at the expense of the feudal nobility, whose castles were no longer able to defy the sovereign. The French were far in advance of their contemporaries, Charles VII. being able to retake in one year all the strong places held by the English. On the other hand, as late as 1453 Constantinople had to be taken by assault, the guns of Mohammed II. being powerless to breach the walls; while the Greek cannon, firing 150-lb. stone balls, did less damage to the Turks than to their own defences. In the middle of the 15th century bombards were universally made of separate pieces of forged iron or bronze, and the great number of attempts at a suitable carriage for the smaller guns showed the importance attached to such a mechanism; culverins were frequently imbedded in stocks which could be raised or lowered to change the inclination, a few having small side projections, the forerunners of trunnions, to prevent lateral rotation.—We have now come to one of the most important eras in the history of artillery, the striking improvements made by the French in the reign of Louis XI., 1461–'83. Having invented trunnions of sufficient strength to stand the recoil, they had an axis about which the gun could turn with ease and be elevated or depressed at will; this great difficulty overcome, they readily devised a carriage at once suited for the transportation and service of the piece, while their progress in metallurgy enabled them to substitute cast-iron for stone balls. The iron projectiles, by their greater density, increasing the tension of the gas so as to endanger the guns in use, they were forced to do away with them and introduce brass pieces of smaller calibre and increased thickness of metal, called cannons, culverins or serpentines, and falcons. The last were the smallest, and fired leaden projectiles instead of cast-iron balls. The culverin, though of less calibre than the cannon, was a much larger gun, and differed entirely from the culverin of the preceding century. Artillery had hitherto been employed in attacking cities and castles alone, but the perfection to which it had been brought in France made it very formidable in the field also. The rapid conquest of Italy by Charles VIII., the successor of Louis XI., was entirely due to his improved artillery; the French guns, mounted on the new carriages, well horsed, and ready to go into battery at any moment, presenting a marked contrast to the cumbersome Italian bombards, firing stone balls, and dragged with great difficulty by bullocks.—During the 16th century brass guns and cast-iron projectiles were adopted throughout Europe, while Tartaglia in Italy made great improvements in gunnery, and invented the gunner's quadrant. The carriages, however, had no limbers and were still heavy and awkward; and as the principal dimensions only were fixed, great differences existed even in those for guns of the same calibre. The cannon belonging to an army, together with the wagons loaded with implements and ammunition, were collected into an artillery train, to which certain officers and artillerists were attached. The latter were looked upon as mechanics, served a regular apprenticeship, and had a guild of their own; they were divided into cannoneers, who served the guns, and artificers, who conducted vertical fire and made up warlike stores. When a war broke out, the different monarchs hired as many as they required or could get, their pay being four times that of a soldier. In battle, artillery tactics consisted in the single detail of putting the guns in position, generally in front of the line, taking care to hide them as much as possible behind troops until they were to open fire. In case of disaster they nearly always fell into the enemy's hands, from its being so difficult to move them. The German, Spanish, and Italian cannon of that age were of sizes and calibres innumerable. Charles V. had more than 50 different kinds, from 124-pdrs. down, and found this such a disadvantage, particularly in the field, that he attempted, though ineffectually, to limit their number to eight, including mortars. About the year 1550 the French calibres, which had run all the way from 80-pdrs. down to 1-pdrs., were reduced to six, viz.: cannons, three sizes of culverins, falcons, and falconets; there were no mortars. During the last half of the century case shot (*Hagelkugel*) was invented in Germany, but was not brought into general use; about the same time shells were successfully fired from mortars in that country, the result being kept a profound secret. These projectiles, originally made by fastening together two hollow metal hemispheres, and known to the Chinese and Arabs, were first introduced into Europe by the Italians. In Holland, mortar shells and hand grenades were first rendered useful and effective during the early part of the 17th century, and Maurice and Henry Frederick of Nassau made many artillery improvements, doing away with the arbitrary distinctions between cannons and culverins, based upon their lengths, and restricting the calibres to 48, 24, 12, and 6-pdrs., called cannons, half cannons, quarter cannons, and falcons, the last two being proportionally longer and heavier to prevent damage to embrasures. The dimensions of these pieces were fixed, while handles and cascables, shaped for the attachment of ropes, facilitated mechanical manœuvres. The gun carriages, which had limbers and ammunition chests, were similarly reduced to four, and their dimensions made so uniform that wheels and other parts were interchangeable.—About the same time Gustavus Adolphus, perceiving the advantages that would result from guns capable of quick motion and rapid fire, introduced light pieces made of thin copper and wrapped about with rope and leather; these, not proving durable, were replaced by iron 4-pdrs. weighing about 650 lbs., and drawn by a single pair of horses. Rapidity of fire was attained by the use of cartridges, the slow process of inserting the powder by ladlefuls being thus gotten rid of. Two of these guns were attached to each regiment, and were at first intended to fire canister, before that time only used in siege operations and by ships of war; but they soon came to fire solid shot, and did great execution at the battle of Leipsic in 1631. Gustavus did much also toward developing the tactical powers of the arm by massing the heavy guns in strong batteries on the wings and centre, and doing away with the old fashion of stringing them out in front of the line of battle. He had great confidence in his artillery, which was very strong in proportion to the other arms, there being 80 pieces in 1630 to 20,000 men, and 200 pieces before Frankfort to only 18,000.—Malthus, a nobleman who had served in the Low Countries, introduced the mortar shell into France, where it was first used in 1634. Mortars of 10, 12, and 14-inch calibre were cast under his direction, and about this time came into general use throughout Europe. The shell after being inserted was kept in place by a tamping of earth, and its fuse was lighted by hand before the mortar was fired. The small mortar which still bears the name of its inventor Coehorn, an officer in the service of the prince of Orange, was first used in 1674. The invention of howitzers was another signal service which the Dutch rendered to the art of war, the idea having first occurred to them that shells might be used in cannon by shortening the pieces so that the projectile could be inserted by hand.

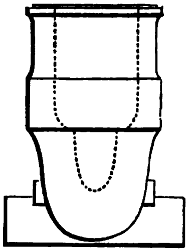


FIG. 4.—Coehorn Mortar.

Howitzers were soon adopted and improved upon by the English; like the early mortars, they were at first discharged by applying fire both to shell and charge. Light pieces called *pierrières*, firing stone balls weighing from 12 to 48 lbs., were still used in some of the European services.—In France, toward the end of this century, artillery matériel was modified and improved, much attention being paid to the character of the gun metal, to the form of the chamber, and to the proper length and weight of the piece. The calibres were restricted to 33, 24, 16, 12, 8, and 4-pdrs., most of which have been retained to this day among their smooth-bore guns; the ammunition consisted of grape and canister as well as of solid shot. Gun carriages were also changed for the better and provided with limbers, while trains of wagons or carts were organized for carrying ammunition; some of the field carriages were made of wrought iron. Louis XIV. was the first sovereign to create a special artillery force; he raised in 1671 a regiment for artillery duty only, and in 1690 founded the first artillery schools. To his age belong also the important inventions of the elevating screw, the prolonge, and the priming tube filled with powder, the old method being to work powder into the vent.—During the first part of the 18th century artillery was generally recognized as an arm, had its regularly incorporated troops, and in consequence made very marked progress. In the campaigns of Marlborough large numbers of guns were used on both sides, and sometimes handled with judgment and skill; at Blenheim artillery, massed on the right so as to enfilade the French position, contributed materially to the victory; and at Malplaquet the English put forward 40 pieces in the centre, while the French guns did not cease firing until the intrenchments were assaulted; only eight or ten were taken notwithstanding this persistence, showing that greater mobility had been attained. In 1732 Vallière made important changes in the French artillery, doing away with the 33-pdr. as too heavy, and giving uniformity to the five remaining calibres as well as to the mortars. In 1747 the French began to fire howitzers in siege operations without first igniting the shell, it having been found that the flash from the charge would light the fuse if there was no tamping. The gun carriages and ammunition wagons were still of various patterns, each arsenal having its own way of constructing them; the axletrees were of wood, and the limbers very low, with horses attached in single file. After the seven years' war position guns began to be permanently assigned to brigades in 5 or 10-gun batteries. In Prussia, Frederick the Great introduced short, light regimental guns, 12, 6, and 3-pdrs., whose weight was but from 80 to 150 times that of the shot; his example was followed by Austria and other countries. He also made extensive use of howitzers firing 15, 20, and 50-lb. shell, which were afterward united in separate batteries. At the end of the seven years' war the Prussian artillery was in a state of great confusion, there being 12 and 6-pdrs. of no less than three different kinds and weights; this was mainly due to the want of a proper chief of artillery, and to the fact that Frederick had looked upon the arm with disfavor. After Rossbach, where it did excellent service, he seems to have gotten over his prejudice, and we are indebted to him for the first formation of horse artillery in 1759: it consisted of a battery of 10 light 6-pdrs., and, though long in a very inefficient condition, and destroyed at Kunersdorf and again at Maxen, was always reorganized. The seven years' war opened the eyes of the Austrians to the importance of the artillery arm, which was carefully reorganized and improved under the direction of Prince Liechtenstein, who was created chief of artillery, with rank and authority in proportion to the importance of his position; this gave their artillery an immense advantage, and assured its constant superiority to that of most of the contemporary powers. The Russians always attached great importance to their artillery. When they entered Germany in 1758 they had 425 guns to 104,000 men, three *licornes* or howitzers, with mounted gunners, being attached to each of their dragoon regiments. Artillery in this century consisted of regimental guns attached in pairs to each infantry battalion, of guns of position organized into large batteries, and of siege or garrison guns. The number of guns was usually 4 or 5 to 1,000 men. The regimental guns advanced with their battalions, unlimbering at 500 paces from the enemy and being thence moved forward by hand. The position guns were posted at the most favorable points along the line; occasionally they were able to take a second position, but it was usually impossible to move them in time to decide the result of a battle. The bronze cannon of this age were elaborately ornamented with carvings and with the ciphers and coats of arms of the reigning monarchs, the early custom of giving a special name to each piece being also retained.—We now come to one of the foremost names in modern artillery annals, Gribeauval. This celebrated Frenchman, having served in the Austrian artillery under Prince Liechtenstein during the seven years' war, returned to France with a thorough knowledge of all the improvements suggested by the experiences of that struggle, and was intrusted in 1765 with the reorganization of the French artillery, then in very poor condition. He began by creating a distinct matériel for each service, field, siege, garrison, and seacoast. His field guns, 12, 8, and 4-pdrs., were 18 calibres long and about 150 times heavier than their projectiles. The charges were reduced from one half to one third the weight of the shot; but, as the windage was also diminished, he was able to make the guns shorter and lighter without sensibly affecting the range. To these were added a 6-inch howitzer, still retaining a small charge, though proportionally larger than that before used. These pieces were without ornaments, and were cast solid and then bored out, which made their dimensions much more exact than the old hollow-cast cannon; the trunnions were strengthened by rimbases, and copper vent pieces enabled the guns to be rebushed. The horses were hitched in double files, which greatly facilitated the movements of the carriages, and the draught was made easier by iron axletrees, higher limbers, and travelling trunnion holes; the allowance of horses was six to the 12-pdrs. and four to the 8 and 4-pdrs. Fixed ammunition, elevating screws, and tangent scales, together with bricoles and prolonges, facilitated the service and increased the mobility of the piece. Stronger carriages were made for the lighter guns, and uniformity was established in all new constructions by requiring the arsenals to make every part of the carriages, wagons, and limbers after certain fixed dimensions, so that spare parts could be taken into the field exactly corresponding to those in use. An equipment was thus obtained which could be moved and repaired with a facility hitherto unknown. Gribeauval's reforms did not stop at the matériel, the personnel of the French artillery being completely reorganized in 1765 through his efforts. Two guns were still assigned to each infantry battalion, which were served by detachments from a company of artillery attached to each brigade of four regiments. The rest of the field artillery was organized into two or three reserves, each reserve consisting of divisions of eight pieces, to each of which was assigned a company of artillery. Here we have the creation of the artillery unit; the company organization, afterward merged in that of the battery with its horses and drivers, being for the first time inseparably joined to its munitions and guns. Like all military reformers, Gribeauval encountered most determined opposition, the changes he proposed not being permanently adopted till 1774. His system was far superior to any other of its day, and long served as a model to that of other nations, being introduced with but slight modifications into all the European services. Thoroughly tested in the wars of the revolution, the results triumphantly vindicated the abilities and military genius of its originator.—The French introduced horse artillery in 1792, and cut down their divisions to six pieces, eight being found too unwieldy; these divisions received the name of batteries, and were usually composed of five guns and one howitzer. In 1799 they entirely abandoned battalion guns as impairing the mobility of the infantry, one or two batteries attached to each division taking their places. An artillery train or corps of drivers, composed of enlisted men, was organized Jan. 8, 1800, and distributed among the French batteries, together with a proper complement of horses bought for the purpose; they had previously depended upon civilian drivers hired with their teams by contractors, the result being that the men, horses, and harness were always in bad condition. No changes in matériel took place under the empire, with the exception of the admission of 6 and 3-pdrs. into the service on account of the immense number of captured guns of these calibres. The tactical combinations of the arm, however, though at first without any essential change, were always brilliant; at Marengo the two batteries of Boudet's division kept the Austrians in check until reënforcements came up and materially assisted in gaining that brilliant victory. The use of artillery in mass dates from the French camp at Boulogne in 1805, where this great tactical improvement was conceived and taught, the first instance of its employment being at Friedland, June 14, 1807. In this battle Gen. de Sénarmont, chief of artillery of the French first corps, combined the divisional batteries into two masses, which suddenly went into action at 600 paces from the Russian left and gradually advanced to within 300 paces, firing with the utmost rapidity; seeing the formidable effect produced, he united both masses into one grand battery of 36 pieces at 150 paces from the enemy, who began to waver under the terrible fire of canister. Upon the Russian cavalry's attempting to charge the grand battery, the general of artillery ordered it to change front and drove them off; the French infantry then advanced and overthrew the enemy. The artillery lost 1 officer, 10 men, and 53 horses killed; 8 officers and 42 men wounded; rounds expended, 2,516, of which 362 were canister. The ground was level and very favorable to artillery fire. The battle of Wagram, July 5–6, 1809, presents another prominent example of the use of artillery masses. Sixty French pieces under Gen. Lauriston, supported by infantry and cavalry, advanced in two columns without opening fire up to canister range of the Austrian centre; only 45 pieces got into position, the others being dismounted by the fire of the enemy's artillery, but these were gradually reënforced by 45 more. The fire of this immense battery, which lasted half an hour, though inflicting great losses, failed to break the Austrians, who repulsed an attack of the French infantry and cavalry; they were however compelled to fall back on account of the turning of their left before the French could reform for a second attack. At Borodino, or on the Moskva, Sept. 7, 1812, and at Lützen, May 2, 1813, the French successfully employed artillery masses for defensive purposes. At the former battle Gen. Sorbier, chief of the French artillery, by uniting 80 pieces, brought the Russians to a stand and finally forced them to retire; at the latter, a battery of 60 guns checked the movement of the allies against the French centre. Further instances of the employment of artillery masses are found in the battles of Ocaña, 1809; Gross-Beeren, 1813; Bautzen, 1813; Hanau, 1813; and Brienne, 1814.—The English artillery about the beginning of the French revolution had been greatly neglected, and was far behind that of other nations. There was no reserve artillery, each regiment having two guns, whose horses and drivers were hired. As late as 1799 there were only two 6-pdrs. to a brigade of infantry, each piece drawn by three horses in single file, the driver on foot with a long wagoner's whip. Horse artillery was however introduced in 1793, and a drivers' corps established the following year. In 1802 the battalion guns were abandoned, and were replaced by field brigades (mounted batteries) and troops (horse batteries). Each field brigade had five guns (12, 9, and heavy or light 6-pdrs.) and one 5½-inch howitzer, while the troops were armed with 9 or light 6-pdr. guns and the howitzer. The detachment of drivers with a field brigade was an independent organization under its own lieutenant, who had no authority over the cannoneers and took rank after all the artillery officers proper. In 1803 Gen. Shrapnel devised a case shot, the first projectile of the kind since the German *Hagelkugel* of the 16th century. It was first used at the battle of Vimieira in 1808, but, not proving very successful on account of the imperfection of the fuse, was not adopted by other nations. —We have now come to the period extending from the peace of 1815 to 1859, when rifled guns were for the first time successfully employed in war. In France Gen. Paixhans proposed in 1822 that large heavy shells should be fired from long-chambered guns, resembling those already invented by Bomford in America; and he proved, in spite of the greatest opposition, that it was as practicable and almost as easy to throw shells to a great distance with slight elevations as to throw shot. Designed originally for the naval service, his chambered pieces, known as Paixhans guns, were felt to be of equal importance for seacoast defence. Their adoption into almost every service, with the consequent development of horizontal shell fire, was beyond question the most important event in the history of artillery since Gribeauval's time, and eventually led to the adoption of iron armor as a protection for vessels of war. The first instance of the employment of this kind of fire on a large scale was at the siege of Antwerp by the French in 1832, where it proved so formidable that the defence were able to make but a feeble resistance. At Sinope, where the whole Turkish fleet was demolished in about an hour by the Russian shells, at Sebastopol, as well as in the more recent naval combat between the Kearsarge and Alabama, Paixhans's predictions as to the destructive effects of heavy shells have been completely verified. The French field matériel was modified in 1827 by the substitution of 32 and 24-pdr. howitzers, lengthened to correspond with 12 and 8-pdr. guns, for the 6-inch howitzer and 4-pdr. gun, which were abolished; the limber of the gun carriage was subsequently lightened and provided with an ammunition chest, its wheels being made of the same size as those of the carriage; the mode of connecting the limber with the carriage was also simplified, so as to greatly facilitate the manœuvres of limbering and unlimbering; while the two flasks which formed the trail were replaced by a single piece called the stock, which permitted the carriage to turn in a smaller circle than before. In 1850 a light 12-pdr. gun devised by Louis Napoleon, and known as the gun-howitzer or Napoleon gun, was experimented upon in France. The object chiefly aimed at in its construction was the substitution of a single gun of medium weight and calibre, firing both shot and shell, for the 12 and 8-pdr. guns and 32 and 24-pdr. howitzers. The new piece, giving very favorable results, was issued in 1853 to the divisional batteries, taking the place of the 8-pdr. gun and 24-pdr. howitzer, the heavy 12-pdr. gun and 32-pdr. howitzer being temporarily retained in the reserve artillery. It was most successfully used by the French during the Crimean war, and was adopted into various European services as well as into that of the United States.—In England the drivers' corps was abolished in 1822, and men were enlisted for the royal artillery both as cannoneers and drivers; the troops of

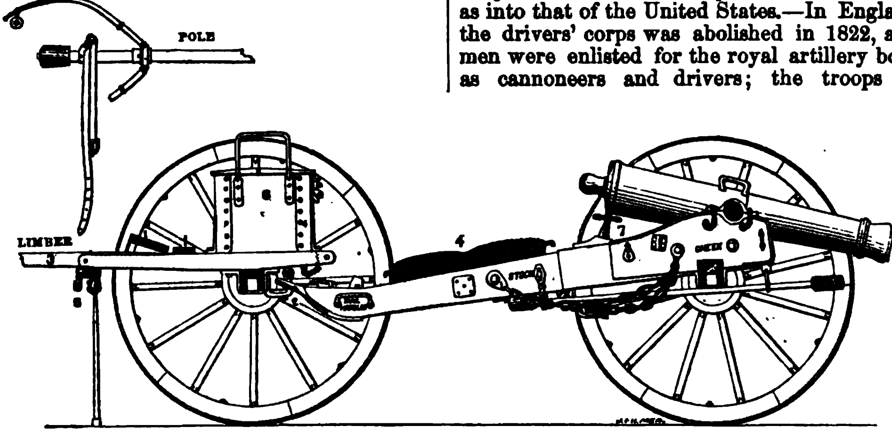


FIG. 5.—Diagram of Gun Carriage. 1, 1. Foot Boards. 2. Pintle Hook. 3. Pole. 4. Prolonge. 5. Trace Hooks. 6. Ammunition Chest. 7. Elevating Screw.

horse artillery, however, continued to have drivers specially enlisted for that purpose, and to this very faulty system the mounted batteries have reverted since the Crimean war. In 1827 three field batteries were organized, each having four pieces and 45 horses. The British artillery continued in a very imperfect state up to 1848, a mistaken notion of economy having kept it insufficiently supplied with guns and horses. At that date, as well as in 1852, it was largely increased and placed on a better footing. Each battery now consisted of four guns and two howitzers; the armament being improved by the substitution of 24-pdr. and 12-pdr. howitzers for the old 5½-inch howitzer, by the introduction of the 32-pdr. howitzer, and by the practical abandonment of the heavy 6-pdr. and 3-pdr. guns. The ammunition, particularly the shrapnel, was also made more efficient by the adoption of Captain Boxer's fuse. At Sebastopol in 1854 the English siege pieces consisted of 32 and 24-pdr. guns, 10 and 8-inch shell guns, and 13, 10, and 8-inch mortars. To these were joined 68-pdr. guns borrowed from the fleet, then thought of enormous size; some of them were fired as many as 4,000 times, with a charge of 16 lbs. of powder and with great rapidity. The calibres of the French siege cannon did not materially differ from those of their ally.—The artillery improvement of the other European powers was steadily maintained during this generally peaceful era, and the importance of the arm continued to be felt in the few campaigns which took place. In the Polish war of 1831, as well as in the Hungarian campaign of 1849, the Russians embraced every opportunity for the employment of artillery in mass. At Warsaw the concentrated fire of a large number of guns decided the success of their *coup-de-main* and put an end to the resistance of the Poles; the loss in the Russian artillery was however very severe, the killed alone amounting to 40 officers, 400 men, and 800 horses. On the other hand, at Inkerman in 1854 the Russian attack failed on account of the unskilful handling of their artillery masses. The principal large calibres of Russian cast-iron guns at the siege of Sebastopol were 120 (shell), 96, 56, and 40-pdrs. In Belgium the invention (1835) of a new fuse by Gen. Bormann gave case shot an importance and utility hitherto unknown; while iron came into general use throughout Europe for heavy gun carriages.—The systems of field and siege artillery in the United States were chiefly derived from those of France. After the war of 1812 with Great Britain the artillery arm was almost entirely neglected; no field batteries were kept up, and the heaviest gun mounted on the seacoast in 1820 was a 24-pdr. About 1839 Secretary of War Poinsett caused field batteries to be organized, which, though few in number, were brought to a high state of efficiency and rendered valuable services during the Mexican war (1846–'8), particularly at Buena Vista, Feb. 22, 1847, where they saved the day. The columbiad, a long-chambered piece capable of projecting shot and shell at high angles and with heavy charges, was invented by Col. Bomford and used during the war of 1812; a similar gun (Paixhans), as we have already seen, was afterward introduced with great success in Europe. In 1844 the columbiad was lengthened and made heavier to enable it to stand an increased charge of one sixth of the weight of the solid shot; but not proving strong enough, even with these modifications, in 1858 its use was restricted to shells, a new gun of improved model taking its place. Wrought-iron carriages for heavy guns were about this time introduced into the United States, and great care was taken in the selection and treatment of American iron, some of which is specially adapted to gun fabrication. About 1847 Gen. Rodman developed his now universally adopted theory of initial tension—in other words, of such a disposition of the metal that when the gun is at rest the interior parts are in a state of compression, while the exterior are in a state of tension; this adds greatly to the strength of the metal, the outer layers being thus forced to stand more and the inner layers less than would otherwise be the case when the gun is fired. To practically obtain this result in cast-iron guns, Rodman had them cast on a hollow core and cooled from within by passing a stream of water through them. In 1850 Admiral Dahlgren proposed a new system of cast-iron guns for the navy, which upon trial gave very favorable results and was adopted in 1855. His guns (9, 10, and 11-inch) were made of cast iron, solid, and cooled from the exterior; to obviate the difficulty of strain due to unequal shrinkage, they were cast nearly cylindrical and then turned down to the required shape, thus getting rid of the exterior metal which caused the strain by cooling first in the mould. The chamber is of the Gomer form, the thickness of the metal around the seat of the charge being a little greater than the diameter of the bore; the chase tapers more rapidly than in other cast-iron guns, which makes the breech appear thicker than it really is. In 1857 the calibres of the land service consisted of 10 and 8-inch columbiads, 42, 32, 24, 18, and 12-pdr. guns, 10 and 8-inch and 24-pdr. howitzers, and

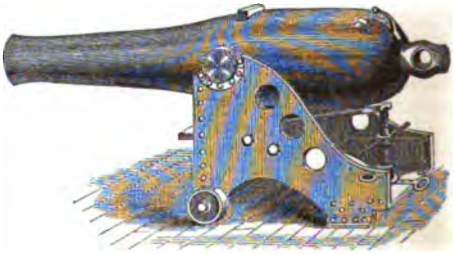


FIG. 6.—Dahlgren Gun.

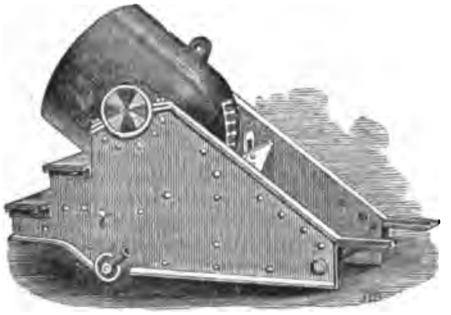


Fig. 7.—13-inch Mortar.

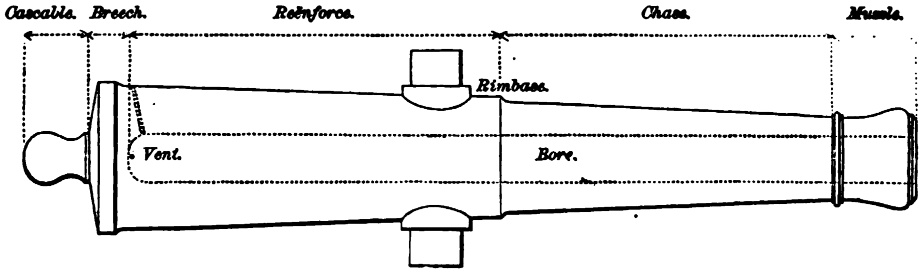


Fig. 8.—Field 6-pdr. smooth-bore Bronze Gun.

13, 10, and 8-inch mortars, all of cast iron. Besides the light 12-pdr. or Napoleon gun, the bronze pieces consisted of heavy 12 and 6-pdr. guns, and of 32, 24, and 12-pdr. howitzers, together with 12-pdr. mountain howitzers and 24-pdr. Coehorn mortars.—We have now come to the most recent period in the history of artillery improvement, extending from the Italian campaign of 1859 to the present date (1873). Although the employment of rifle cannon in war was originally attempted by the English, the French are entitled to the credit of first successfully using them in battle. The English 68-pdr. and 8-inch Lancaster rifles failed at Sebastopol in 1854, the shot jamming in the bores; but the French bronze rifled fours, after a model devised by Col. Treuille de Beaulieu, were brilliantly successful in the Italian campaign of 1859. So recent was their construction that the batteries had to march with empty carriages, the guns being boxed up and sent to the army after it had left France. Once in Italy, the incontestable superiority of the French artillery seemed to recall the days of Charles VIII.; at Solferino particularly, it destroyed the Austrian batteries at the unprecedented range of 1,600 yards before they could get into position to return the fire, and shook the confidence of the reserves by shelling them at distances hitherto deemed entirely safe. When every gun fired a cast-iron spherical projectile, its weight indicated the diameter of the bore, or calibre of the piece; but with the elongated projectiles of rifled cannon which are of various lengths, the case is very different, the weight of the shot being no indication of the power of the gun, nor giving any definite idea of the size of the bore. With French rifle projectiles whose length does not exceed twice their diameter, the same numbers designate their calibres as of old, but they now refer to kilogrammes instead of pounds; thus the 4-pdr., or four, formerly meant that the gun fired a cast-iron sphere weighing 4 lbs., but now signifies that its projectile weighs about 4 kilogrammes or 8·823 lbs. Compared with English guns of the same diameter of bore, the French throw a lighter shot, the English projectiles, particularly the Whitworth, being always longer. The rifled twelves, consisting of the gun-howitzers (Napoleon guns) converted by rifling, were not used in Italy, there not being enough ammunition, but were successfully tested in Mexico; at Puebla they were found very useful in breaching masonry. The French also transformed by rifling the old 12-pdr. field gun into a gun of reserve and position, the old long 12-pdr. gun into a garrison gun, and the short 24-pdr. gun and 50-pdr. gun into siege guns. None of these pieces fire solid shot; the three kinds of twelves use the same projectiles, but with different charges of powder. The short twenty-four weighs 2,000 kilogrammes or two tons, and the charge is varied according to the range desired, up to a maximum of 2½ kilos (5½ lbs.), which gives a range of 5,000 metres; the carriage of the gun enables it to be fired as a mortar. The long twenty-four only differs from the short by its length and weight, which is three quarters of a ton (740 kilos) more. The fifty is not heavier than the short twenty-four, and is fired with the same charge of powder; its projectile weighs 51 kilos (113 lbs.), with a bursting charge of 3·5 kilos (7 lbs. 13 oz.). Both are mounted on the same carriage, which is drawn by only six horses. Following the same principles, the French artillerists have also utilized some of the old Paixhans guns by rifling and hooping with steel; a gun of this kind of 22 centimetres bore weighs about 14 tons, and throws 170-lb. hollow projectiles to a distance of 6,000 or 7,000 yards. So, too, with their naval guns: the old thirties, originally intended to carry spherical 32-lb. shot with a charge of 11 lbs., after being hooped and rifled became useful and valuable pieces. Although the French artillery board rejected the breech-loading system as a needless complication for field guns, they were quick to adopt it for heavy ordnance as economizing space, greatly increasing the ease and rapidity of loading, and affording more protection to the cannoneers. The principal French naval guns are the 6½-inch, 7½-inch, 9½-inch, and 10¾-inch breech-loading rifles, consisting of a core of cast iron with a reënforce of steel hoops made of a double series of steel rings, one over the other, so as to break joints. In the aperture of the bore a female screw of 15 or 16 threads is cut into the metal of the gun, which receives a cylindrical screw or breech plug, mounted in front, with an elastic steel cup or gas check. That time may not be wasted at each discharge by screwing and unscrewing the whole length of the plug, its surface, as well as that of the female screw in the breech, is divided into six equal parts, from three of which the threads are removed; when the breech is to be closed the threaded portions of the plug are presented so that they come opposite the smooth parts of the hole, and *vice versa;* the plug or stopper is then pushed in, and a third of a turn with the handle brings the screws of both parts together. No further changes were made in the matériel of the field batteries before the war with Prussia in 1870, where the French guns for the first time in history were found far inferior to those of their opponents in range, accuracy, and power of execution, the weakest points about them being the want of flatness in the trajectory and the rapidity with which enlargements and lodgments occurred in the soft metal of the bore. Their projectiles, too, were not effective, many bursting in the air or burying themselves in the ground without producing any effect, while the German percussion shells almost invariably exploded on touching the object. The striking superiority of the Prussian batteries with the Krupp breech-loaders was freely admitted by the French, and had a most important bearing upon the issue of the war. In this struggle the *mitrailleuse* or machine gun was introduced and extensively used by the French, in batteries of ten pieces each, and with most destructive effects. The weapon is on the same general principle as the Montigny mitrailleuse, which has 37 barrels fitted and soldered into a wrought-iron tube, with a movable breech piece worked by a lever, and so arranged that the barrels can be fired simultaneously or at any interval, reloading taking five seconds, and ten discharges per minute being maintained if necessary. The Gatling mitrailleuse, adopted by the United States several years previously, has not been actually employed in war. Several hundred new bronze breech-loading sevens were made in Paris during the siege and used with effect, and great attention has been paid since the war to the reorganization of the French batteries, it being intended to suppress the old muzzle-loading guns as soon as a definite breech-loading system can be determined upon.—The regimental organization of artillery, which has been always maintained by the French and other great European powers, was abolished in England in 1859, brigades of horse, field, and garrison artillery taking its place; each brigade consists of eight batteries, the terms troop and company being done away with. In 1862 the royal artillery was consolidated with that of the Indian army, the artillery establishment being then divided into 5 horse artillery brigades and 25 field and garrison brigades; it now consists of 6 horse, 8 field, 14 garrison, and 3 mixed brigades of field and garrison artillery; to these must be added one depot and one coast brigade. The Armstrong system was adopted in 1859, after the unsuccessful début of the Lancaster guns in the Crimea, and up to 1864 nearly $13,000,000 were expended in its development. Experience showed, however, that it was too complicated and would not stand the test of active service; the fermature of the breech-loaders, 40, 20, 12, 9, and 6-pdrs., proved very defective, and the lighter calibres have been lately superseded by muzzle-loading rifles, 7, 9, and 16-pdrs., except in the horse batteries, where a few Armstrong guns are still retained. The heavier calibres, muzzle-loading 600, 300, 150, and 70-pdrs., have been replaced since 1867 by guns of the Frazer system; these new guns are 600, 400, 250, 180, and 115-pdrs., the corresponding calibres being 12, 10, 9, 8, and 7 inches; they are all rifled on the Woolwich system, the twist being uniform in the 7-inch, but increasing in the higher calibres; a 700-pdr. of 35 tons has been recently made, its calibre being 11½ inches. The 64-pdr. muzzle-loading rifled gun is of various constructions, Armstrong, Frazer, and Palliser converted cast-iron, the last being rather heavier than the others. All the heavy guns fire the Palliser chilled shot, cast-iron projectiles with gun-metal studs, except in those common to the various 64-pdrs., which have copper studs.—During the past 20 years a number of different systems of rifled ordnance have been invented in England, the two most prominent being the Armstrong and Whitworth. Armstrong guns are both muzzle-loaders and breech-loaders, the fermature being only strong enough to apply to the smaller calibres. The latter are made by welding together at the ends wrought-iron tubes, made of spiral cords formed by twisting a square bar around a mandrel and then welding; two additional thicknesses or tubes envelop it in rear of the trunnions to give it more strength, the outer of the same material as the inner, the inner one formed of an iron slab bent into a cylindrical shape and welded at the edges; the breech is closed by a vent piece slipped into a slot and held in its place by a breech screw, which presses against it from behind; the screw is tubular, so that the charge can be passed into the chamber when the vent piece is withdrawn; the vent is in the breech piece, which can be easily renewed when the former becomes enlarged. In the large muzzle-loading Armstrong guns the barrel or part surrounding the bore is made of solid steel tempered in oil, which diminishes brittleness and adds to the tenacity; the barrel in rear of the trunnions is enveloped by three layers of wrought-iron tubes, not welded together at the ends, but hooked to each other by a system of shoulders and recesses; the tube around the barrel opposite the seat of the charge is called the breech piece, and is not made of spiral bars like the others, but has its fibres and welds longitudinal so as to resist the recoil of the barrel against the head of the breech plug screwed into the breech piece. The number of grooves in the breech-loaders is 84, and the twist one turn in 9 feet; in the muzzle-loaders the grooves are from 3 to 10, and the twist from one turn in 30 to one turn in 38 calibres. The muzzle-loading Armstrongs were formerly rifled upon the shunt system, in which the grooves are much wider than the buttons on the projectile, except near the bottom of the bore; that part or side of the groove passed over by the projectile in passing down the bore is deep enough to admit the buttons freely, while the other side is so shallow that the ends of the buttons are pressed against it as the projectile comes out, thereby forcing its centre or axis toward the axis of the bore. This system has altogether failed in calibres larger than the 9-inch, and was finally abandoned in 1870 even for small calibres. In 1865 the French soft-metal stud and bearing system of rifling was adopted for large muzzle-loading guns, under the name of the Woolwich system; after seven years' trial it is not found to give general satisfaction, and will probably be changed. The Frazer gun is a modification of the Armstrong; the number of coils being lessened, cheaper iron used for the outer coils, which are shrunk on with the trunnion piece, and the arrangement of shoulders and recesses, to prevent separation of the parts, being improved. Whitworth guns are made of a substance called "homogeneous iron," a species of low steel said to be made by melting short bars of Swedish iron and adding a small amount of carbonaceous matter. The smaller Whitworth guns are forged solid; the larger built up with coils or hoops, which are forced on by hydraulic pressure, being made with a slight taper and the ends joined by screw threads. The hoops are first cast hollow and then hammered out over a steel mandrel, or rolled out in a machine like that used for forming wheel tire; before receiving their final finish, they are subjected to an annealing process for three or four weeks, which, though making the metal very ductile, slightly impairs its tenacity; the breech pin is made with offsets in such a way as to screw into the end of the barrel and the next two surrounding hoops, the breech in the larger guns being hooped with a harder and higher steel than that used for the barrel. The cross section of the bores of the Whitworth guns is a hexagon with rounded corners, and the twist is very rapid. The projectiles are very long, those intended for armor punching being made of hardened iron or steel with very thick flat heads to prevent glancing; shells of this kind have no fuse, the bursting charge being ignited by the heat generated by the violent blow of the projectile on the plate; the powder before being inserted is wrapped in one or more thicknesses of flannel, thus interposing a slow conductor between it and the heated metal, and delaying the explosion until the shell has completed its penetration. The principal Whitworth guns are the 120, 70, and 12-pdrs. of 6·4, 5, and 2·75 inches diameter respectively, and firing 151, 81, and 12-lb. projectiles.—The Blakely gun combines in its construction the principles of initial tension and varying elasticity, the object being to bring the strength of all the metal of the piece into simultaneous play to resist explosion. The inner tube or barrel is made of low steel, having considerable but not quite enough elasticity; the next tube is made of high steel with less elasticity, and is shrunk on the barrel with just sufficient tension to compensate for the insufficient difference of the elasticity between the two tubes; the outer cast-iron jacket, to which the trunnions are attached, is the least elastic of all, and is put on with only the shrinkage obtained by warming it over a fire. The steel tubes are cast hollow and hammered over steel mandrels, under steam hammers; by this process they are elongated about 130 per cent., and the tenacity of the

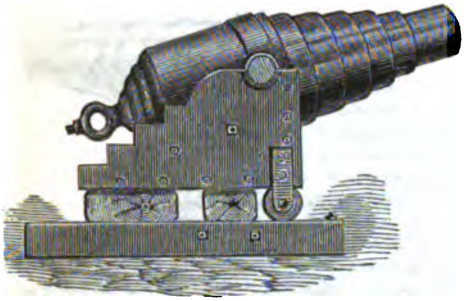


FIG. 9.—Armstrong Gun.

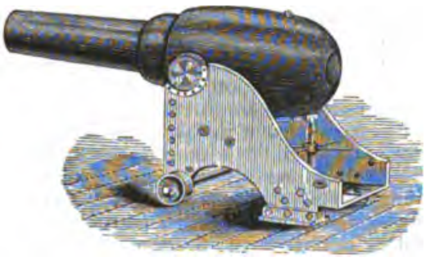


FIG. 10.—Whitworth Gun.

metal is increased; all the parts are annealed. Blakely guns are rifled with one-sided grooves, and are fired with expanding projectiles. The principal calibres are the 700, 550, 350, 250, 200, 120, and 100-pdrs., the diameters of the bore varying from 12 inches to 6·4 inches, and the weights of projectiles from 700 to 100 lbs. Palliser's manner of making a gun consists in introducing into a cast-iron gun a hollow cylinder of coiled wrought iron, of such thickness in proportion to its calibre that the residual strain borne by the tube has such a relation to the strain it transmits to the surrounding cast iron as is best proportioned to their respective elasticities; and by varying the thickness of the tube, the transmitted strains can be regulated with the greatest nicety. In the larger guns he proposes to use two or more concentric tubes; in the very largest, three tubes, the inner one to be of the softest and most ductile wrought iron, the next of a stronger and harsher quality, and the third of steel for some distance in front of the chamber. Old smooth-bored guns, chiefly 68-pdrs., reamed out and strengthened in this way, have shown remarkable endurance, and have been thus utilized in large numbers. Parsons's plan of conversion consists in introducing a tube with a jacket, both of steel, through the breech of a gun, which is afterward stopped up by screwing in a large cascabel; though stronger than Palliser's method, it is much more expensive. Moncrieff's counterpoise gun carriage is designed to shield heavy guns from direct fire, and enable them to be loaded under cover. Having given satisfactory results upon its trial in 1868, the British propose to use it extensively for coast defence, particularly in low sites where the batteries are but little above the water level. The top carriage rests on a strong bolt connecting two elevators, curved in rear, and with a box between them for the counterpoise, which is rather heavier than the gun. Upon firing the recoil makes the elevators roll backward on the chassis, the gun descending and the counterpoise rising. The weight of the latter gradually checks the motion and brings the piece to rest below the parapet, where a brake holds the elevators down until the loading is completed.—During the past decade the Prussian artillery has taken the foremost place, a consequence in great part of Krupp's excellent system of breech-loading rifled cannon. The Krupp guns are made of cast steel, composed of puddled steel and pure wrought iron, melted in crucibles and then run into large ingots, which are worked under powerful steam hammers; the fermature consists of a block sliding in a horizontal mortise crossing the bore, which is continued through the gun; the gas check is a steel ring, which by its expansion prevents the escape of the gas. In loading, the breech block is only drawn out far enough to allow the charge and projectile to pass through a hole in its end; an exterior lever working on a hinge starts the block, which being guided by proper grooves can be readily moved in or out. The rifling is polygrooved, the lands being very much narrowed at the breech, which relieves the initial strain due to the forcing of the projectile into the grooves. The various calibres are forged from a single ingot up to the 9-inch, in which the trunnion ring is a separate forging; the larger guns are built up by shrinking successive hoops of steel over a central steel tube, the fermature in the experimental 14-inch being slightly modified so that the charge and projectile are inserted at the side of the breech instead of through the end. The Krupp projectiles are of cast steel lead-coated, and take the rifling at four raised rings on their surface. The deep grooves cut in the steel to retain the lead reduce the strength of the shells so much that they can only contain very small bursting charges compared with those of other systems; the Armstrong and Whitworth 9-inch shells carrying charges of from 10 to 14 lbs., while that of the Krupp 9-inch is less than 4 lbs. The Krupp cannon sometimes use Gruson's chilled iron projectiles. Krupp sixes and fours, firing 13·8-lb. and 8·5-lb. projectiles respectively, were adopted in the Prussian field artillery in 1864, and gave so much satisfaction that they were exclusively used in the war of 1866 with Austria, although one third of the Prussian batteries were then armed with the old 12-pdr. smooth-bore. In the late war with France the marked superiority of the Prussian field guns was greatly enhanced by the skilful manner in which they were handled. The principal battles, from Weissenburg and Forbach to Gravelotte, Beaumont, Sedan, and Metz, as well as the engagements with the French army of the north and second army of the Loire, were to a great extent a series of artillery combats; and both French and Prussians attribute the unprecedented successes of the latter mainly to the artillery, which whenever practicable was employed in mass. At Wörth a grand battery of 96 guns covered the overwhelming attack on MacMahon; near Gravelotte over 300 guns deployed on the road to the right of St. Privat and

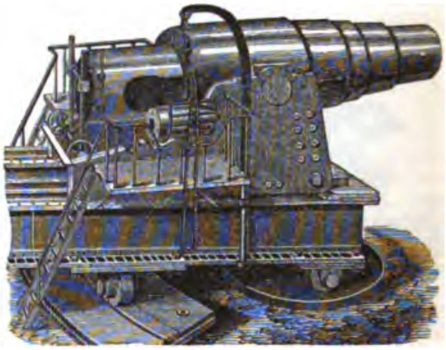


Fig. 11.—Krupp Gun.

forced the French infantry to retire; and at Sedan, the greatest artillery battle of the war, the fire of more than 750 guns repeatedly drove back the French troops, with the enormous loss of 10,000 killed and 20,000 wounded. The heaviest Krupp guns used at the siege of Paris were 6-inch (15-centimetre), weighing about 6,000 lbs. and firing 55 to 60-lb. projectiles; they were opposed to the heaviest French naval guns. As a matter of economy, converted twelves and twenty-fours of bronze and cast iron are temporarily retained in the Prussian service for siege and reserve purposes. The larger Krupp calibres are from 6 to 8, 8 to 9, 9 to 10, 11, 12, and 14 inches, most of them being used in both the land and naval services of Prussia. The 8-inch seacoast gun (209-lb. projectile) can be used with great effect up to 1,800 yards against ships covered by 4½-inch plates; and within the same range the 9-inch gun (297-lb. projectile) can do very serious injury to 6-inch armor plates; up to 700 yards the 9-inch gun can breach an 8-inch shield, but at greater distances 11-inch guns must be employed, which, with their 495-lb. projectiles, are very effective against the heaviest ironclads at 2,000 yards. But two 14-inch guns have been made; with an 150-lb. charge they fire shells weighing 1,080 lbs., exclusive of a bursting charge of 17 lbs., the weight of the solid shot being 1,212 lbs. The 14-inch, with its carriage and turntable, weighs about 90 tons; the gun alone 112,000 lbs., not quite as much as the American 20-inch Rodman. The English have always deemed steel guns dangerous, which is true so far as large solid steel guns are concerned; the built-up guns of this material have however shown remarkable endurance, but in justice to other systems it should be stated that the Rodman prismatic powder, exclusively used in the Krupp guns, gives extremely low pressures. In a recent competitive trial of endurance, however, between a 9-inch Krupp and a 9-inch Armstrong, both using prismatic powder, the German gun had a decided advantage. To Prussia also belongs the credit of the introduction of the new 8¼-inch rifled mortar, the projectile having a bursting charge of 15 lbs., and exploding by a percussion fuse; it was used during the late war at the sieges of Paris, Belfort, and other places, the precision of its fire being very remarkable. Russia adopted in 1859 French bronze rifled fours; these have been given up and replaced by Krupp fours and nines, as well as by bronze breech-loading fours and nines, the bores lined with steel tubes, made at the arsenals so as to utilize the old material. The fours weigh 765 lbs., their projectiles 16 lbs.; the nines 1,382 lbs., and the projectiles 31½ lbs. The Krupp system has been also adopted for heavy guns, some of which are constructed by the government at the Abukoff works near St. Petersburg; the 8 and 9-inch guns were the largest calibres up to 1868, when the 11-inch gun was added. Russia has also adopted the Prussian rifled mortar; there are two calibres, 8 and 6-inch, weighing 8,624 and 3,360 lbs., with 195 and 90-lb. projectiles, the charges being 19 and 8 lbs. respectively. Immediately after the Italian campaign of 1859 the Austrians put in service field guns very similar to the French fours; later they had rifled guns on the Lenk system, which were fired with guncotton instead of powder; finally in 1868 they adopted an entirely new system of muzzle-loading bronze guns, of two calibres, eights and fours, weighing 1,099 and 580 lbs. respectively, with 14½ and 8-lb. projectiles. For mountain service bronze rifled threes are used, weighing only 185 lbs. and firing a 5-lb. projectile. The Krupp system has been adopted for all their heavy guns. Italy and Spain adopted without modification the French system of bronze muzzle-loading rifles, which in the latter country were replaced in 1868 by Krupp field pieces, some bronze breech-loaders being also made. Following the example of France, Spain had her large cast-iron cannon hooped to increase their durability, the results giving great satisfaction. The 8-inch Krupp is now included among her heavy guns, and in Cuba she has in service a great many large American cannon, Parrott rifles and Rodman smooth-bores. Belgium has Krupp fours and sixes with calibres of 3 and 3·5 inches; her heavy guns are on the same system. The Krupp field guns are also used by Turkey, Roumania, and Servia, as well as in China and Japan. Switzerland, after adopting in 1862 rifled muzzle-loaders, exchanged them in 1866 for steel breech-loaders. The Swedish, Dutch, and Danish governments, like the French, construct their large rifles of cast iron hooped with steel; some of them have shown great endurance, a Swedish rifle, it is said, having been fired 1,100 times.—In the United States cast-iron cannon attained an unrivalled degree of perfection. Gen. Rodman's model, which does not materially differ from that of 1858, was adopted in 1860 for all seacoast cannon; the exterior shape is remarkable for its simplicity and relative lightness, the parts being proportioned with reference to the exact amount and locality of the strain, to the entire neglect of the merely ornamental or traditional. Rodman's method of hollow casting having, in conjunction with

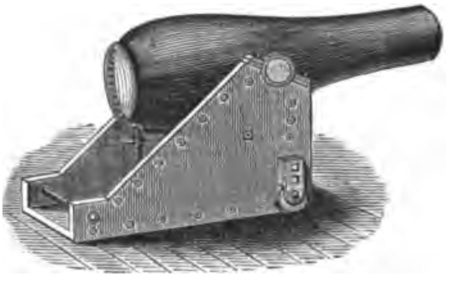


FIG. 12.—Rodman Gun.

his big-grained powder, obviated the main difficulties in making very large cast-iron cannon, a 15-inch gun weighing 50,000 lbs. was successfully cast in 1860, followed in 1863 by a 20-inch gun weighing 115,000 lbs. and firing a 1,080-lb. solid shot. The Rodman smooth-bores are the 20, 15, 13, 10, and 8-inch, the last two being but temporarily retained in service until replaced by heavier guns; only two 20 and two 13-inch guns have been made for experimental purposes, but they have given favorable results. A large number of 15-inch Rodmans are now in service; the shell weighs 330 lbs., the solid shot from 440 to 425 lbs., the service charge being 100 lbs., which will give an initial velocity of 1,500 feet. The accuracy of the gun at 1,500 yards is as great as that of any rifle; its trajectory within this distance is flatter, and the projectile being round has greater precision in ricochet fire. On the other hand, rifles can project loaded shells of peculiar construction so as to penetrate and then explode in the object; their projectiles do not lose their velocity as soon as those of smooth-bores, so that they are more effective at long ranges; while if made of wrought iron or steel, though far more costly, they have much greater endurance than cast-iron guns. The experimental Rodman cast-iron rifles, 12 and 8-inch, the former having the exterior form of the 15-inch smooth-bore, were found not to possess the requisite strength, and the United States is now (1873) about to experiment upon several other systems of rifled cannon, with a view to the adoption of that found most advantageous. The 20, 15, and 13-inch, and of late the 11-inch, naval guns have the Dahlgren exterior shape, but are cast hollow with the Rodman elliptical chamber. A 3-inch rifle muzzle-loading wrought-iron gun was adopted in 1861; it is made by wrapping boiler plate about an iron bar so as to form a cylindrical mass, which is brought to a welding heat in a furnace, and then passed between rollers to thoroughly unite it; the trunnions are afterward welded on and the piece bored and turned to the proper size and shape, the latter being of the general character of the Rodman pattern. Its weight is 820 lbs., that of the projectile being only 10 lbs., in which respect it does not compare favorably with the Prussian, Russian, and Austrian fours, which fire a much heavier projectile in proportion to the weight of the piece. The 4½-inch rifle is similar in shape to the 3-inch, and was adopted about the same time: it is of cast iron cooled from the exterior, its weight being 3,450 lbs., that of the projectile 30 lbs., while the Russian nine, which only weighs 1,382 lbs., fires a 31½-lb. projectile. Though intended for siege and garrison purposes, it has been used with an army in the field in spite of its want of mobility. The Parrott muzzle-loading rifles are cast-iron pieces of ordinary dimensions, strengthened by shrinking a wrought-iron hoop or barrel over that portion of the reënforce which surrounds the charge; the cast-iron body in the larger calibres is hollow-cast on the Rodman plan; the barrel is shrunk on by the aid of heat, the cast iron being prevented from expanding by a stream of cold water made to run through the bore. Parrott guns consist of 300, 200, 100, 30, 20, and 10-pdrs., the diameter of the bores being respectively 10, 8, 6·4, 4·2, 3·67, and 3 inches, and weights of projectiles 250, 150, 86, 28, 19, and 10 lbs. This system has not been adopted by the United States government, though a great many Parrott rifles were used during the civil war, and a certain number of guns of the larger calibres are still temporarily retained. While some Parrott cannon have shown very great endurance and been largely used in breaching masonry and other siege operations, a number have burst, particularly in the navy, the accidents being mainly ascribed to the breaking and wedging of the projectile in the bore; the inventor, however, now asserts that he has corrected this evil. At the beginning of the war a number of old 42 and 32-pdrs. were rifled on the Parrott system for temporary use, and served with projectiles of twice the weight of the corresponding round shot; the 42-pdrs. only were hooped. The Brooke gun, made and used by the confederates, is very similar to the Parrott in shape and construction, except that the hoop is made of wrought-iron rings not welded together. King's counterpoise gun carriage, recently tried in the United States, was found to excel Moncrieff's in strength and simplicity, while giving equal protection to the piece and cannoneers. The counterpoise, connected with the top carriage by ropes and pulleys, is placed in a well made in the parapet opposite the gun; the chassis slopes considerably to the rear, so as to form an inclined plane for the descent of the piece and top carriage; as the recoil forces them back and down, the counterpoise rises in the well until its weight suffices to bring the piece to rest behind the parapet. The counterpoise being heavier than the gun, the cannoneers have no difficulty in making it run up into battery after throwing the eccentric wheels into gear. An improved form of the ribaudequin or organ gun of the 15th century, temporarily in the United States service, received favorable mention at the siege of Charleston in 1863, under the name of the Requa rifle battery; it consisted of 25 horizontal barrels in an iron frame,

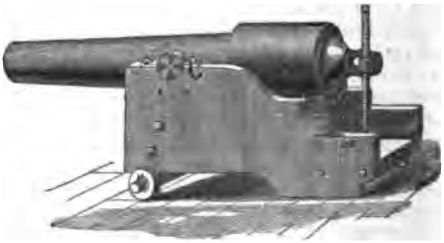


Fig. 13.—Parrott Gun.

a sliding bar in rear worked by two levers forcing the cartridges into the chambers. Gatling's mitrailleuse or machine gun was adopted just too late to be used in the war. It is composed of ten barrels, a hand crank causing them to revolve about a central axis parallel to their bores; as each barrel comes opposite a certain point a self-primed metal-cased cartridge, falling from a hopper, is pushed into the breech by a plunger, where it is exploded by the firing pin. The machinery is simple and not apt to get out of order, and the gun can fire 400 shots a minute with great range and precision. There are two calibres in the United States service, 1-inch and ½-inch, the former firing, besides the ½-lb. bullet, a cartridge containing 16 smaller projectiles, which at short ranges is highly effective. As the weight of the largest gun (600 lbs.) is very great compared to that of the charge, there is little or no recoil, and when once pointed it requires hardly any adjustment. It is an admirable arm against night attacks, as well as to sweep flanks of fortifications, bridges, streets, breaches, &c., and is in general use in the United States for the defence of military posts on the Indian frontier. The Gatling gun has been also adopted by England, Russia, China, Turkey, and Egypt. The light guns employed by the United States troops during the civil war consisted of 3-inch wrought-iron rifles, 3-inch Parrotts, and 12-pdr. Napoleon guns; the last, though abandoned in Europe, being still retained in the American service. Heavy rifled guns played a very prominent part in siege operations, the reduction of Fort Pulaski demonstrating that at 2,400 yards they can breach the best constructed brick scarp; at Fort Sumter the barbette fire was entirely destroyed and the work badly crippled by 14 Parrott rifles (300, 200, and 100-pdrs.), at ranges varying from 3,428 to 4,290 yards. Vertical fire was largely used also on both sides. In April, 1862, Fort Jackson, Louisiana, was bombarded at from 2,950 to 3,980 yards by 19 13-inch mortars from the mortar flotilla under Admiral Porter; the fire was exceedingly accurate, and at the end of seven days made the place untenable. At the assault after the explosion of the mine at Petersburg, July 30, 1864, 10 10-inch mortars, using case for the first time in America, prevented an annoying confederate battery from firing a single shot. The little 24-pdr. Coehorn mortar proved very useful, particularly at the sieges of Charleston and Petersburg. This war also presents various instances of the employment of artillery masses. At Malvern Hill, July 1, 1862, the repeated assaults of the confederate infantry were handsomely repulsed by a grand battery of more than 150 guns under Gen. Barry, chief of artillery, posted on the heights to the west of the plateau. At Chancellorsville, May 2–3, 1863, after the rout of Howard's corps, the victorious confederates were checked and driven back by 24 pieces in mass hastily collected from different corps; and at the same time another battery of 38 guns assembled near Fairview under Col. Best, chief of artillery of the 12th corps, did great service in keeping back the enemy. At Gettysburg, July 1–3, 1863, 120 confederate guns under Gen. Pendleton, chief of artillery, opened on the left of the Union army preparatory to an assault. Their fire was, however, too much dispersed; and although Gen. Hunt, chief of artillery, could only bring 80 pieces to reply, he was able to render most efficient assistance to the infantry in repulsing both of their grand columns of attack.—Rapid as the development of artillery has been since 1850, we are still in a period of transition due to the successful introduction of rifled cannon. This condition of change has also necessarily extended to the science of fortification, which must conform to the offensive capacities of artillery. (See CANNON, GUNNERY, and GUNPOWDER.)

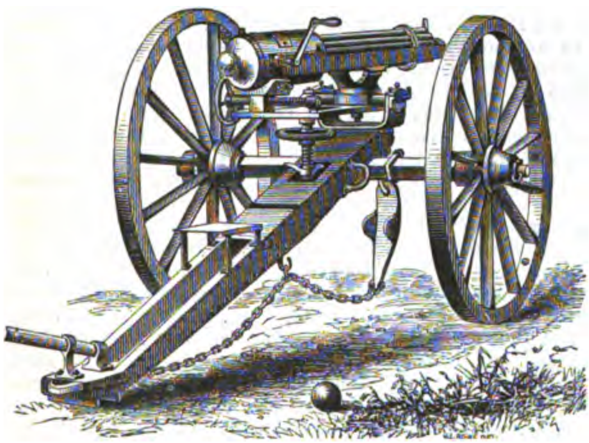


FIG. 14.—Gatling Gun.

ARTIODACTYLES, a name given by Owen to the even-toed division of the *ungulata* or hoofed, herbivorous animals, including the ruminants or the two-toed animals which chew the cud, like the cow, sheep, antelope, camel, and the fossil anoplotherium, and the omnivorous mammals like the hog. In the opposite division of the *perissodactyles*, there is an odd number of toes: either one, as in the solidungulate horse and hipparion; three or five, as in the multungulate tapir, rhinoceros, and palæotherium; or five, as in the proboscidian elephant and mastodon.

ARTOIS, a former province of northern France, which, with a small portion of Picardy, now forms the department of Pas-de-Calais. It lay principally between Flanders on the N. E. and E. and Picardy on the S. W.; area, about 1,800 sq. m. The land is here almost level, and the soil is exceedingly fertile, owing to the abundance of streams. Artesian wells receive their name from Artois, where they have been common for many years. (See PAS-DE-CALAIS.) Artois was named from the Atrebates, its original inhabitants. After being subject from the 5th to the 9th century to the Franks, it was made in 863 a part of the dowry of Judith, daughter of Charles the Bald, when she married Baldwin of Flanders, but it was restored to France when Isabella of Hainault married Philip Augustus in 1180. Louis IX. made it a county in 1236, under his brother Robert as count. Artois was henceforth governed by Robert's descendants, male and female; but one of the latter marrying a Flemish prince, the county became part of Flanders until the treaties of the Pyrenees and of Nimeguen (1659 and 1678), when it was again made part of France. Before his accession to the throne (1824) and after his abdication (1830) Charles X. bore the title of count of Artois.

ARTOT, Joseph, a Belgian violinist, born in Brussels in 1815, died in Paris, July 20, 1845. When a mere child, he was able to execute very difficult pieces on the violin. In the conservatoire at Paris, he won at the age 13 the first prize for violin playing. After travelling over Europe with marked success, he associated himself in 1843 with Mme. Damoreau, and they gave concerts in the United States, soon after which he died.

ARUNDEL, Thomas Howard, earl of Arundel and Surrey, an English patron of art, born July 7, 1592, died in Padua, Oct. 4, 1646. Under Elizabeth he enjoyed by courtesy the title of Lord Maltravers. The titles forfeited by the attainder of his father were restored in 1603; he was created earl marshal in 1621, and earl of Norfolk in 1644. He served as privy councillor, lord high steward at the trial of Lord Strafford, envoy to the queen of Bohemia and the states general of the Netherlands, and ambassador extraordinary to the emperor Ferdinand II. He is best remembered by his gallery of statuary, which he commenced during his residence in Italy (1607–'14), and for the collection of which he sent John Evelyn to Rome, and Mr. (afterward Sir) William Petty to Greece and Asia Minor. The English ambassadors at the Hague, Turin, Brussels, and Madrid also aided in its formation. Petty acquired valuable works at Paros, Delos, and Smyrna, particularly the celebrated Parian Chronicle, a long, oblong slab of marble, with important chronological records. The Arundelian collection, when entire, comprised 37 statues, 128 busts, and 250 marbles with inscriptions, exclusive of sarcophagi, altars, and fragments; it included also gems, medals, and other intaglios which Lord Arundel had purchased at Venice from Daniel Nys for £10,000. During the civil war (1642), when he returned to Italy, part of the collection, chiefly the gems, were believed to have been removed by him; while of those confiscated by parliament a number were said to have been secured by the Spanish ambassador in London, through the medium of Cromwell, for removal to Spain.—On Lord Arundel's death his personal estate was divided between his eldest son Henry and his second son Sir William, the celebrated Viscount Stafford, who was executed in 1680. His grandson Henry, 6th duke of Norfolk, in 1667 presented the inscribed marbles forming a part of his moiety to the university of Oxford, at the instance of Evelyn and Selden. The statues, chiefly the busts, were in 1755 presented to the university of Oxford by the countess dowager of Pomfret, into whose possession they had passed. Other works of the Arundel collection were scattered; some went to Chiswick House, others to Beaconsfield, to Fawley Court, to the Norfolk seat at Worksop Manor, &c. The divorced duchess of Norfolk, by whom the busts and statues were sold, was also the owner of the cameos and intaglios, which finally passed to the duke of Marlborough and are known as the Marlborough gems. Lord Arundel's favorite bronze head of Homer, which is introduced into his portrait by Vandyke, was purchased by Lord Exeter and presented by him to the British museum. The greater part of the Greek inscriptions in the Arundel collection at Oxford were, according to Gassendi, discovered by Peiresc at Smyrna previous to their having been secured by Petty. They were increased by Selden's private collection and other contributions to 150 inscribed marbles of various descriptions. It is proposed to remove both the Arundel and Pomfret marbles from the rooms beneath the Bodleian library, where they now are (1873), to the new Oxford museum. The Parian Chronicle was executed at Paros about 263 B. C., and contains chronological records from 1582 to 264 B. C. Celebrated among Lady Pomfret's contributions to the collection are a colossal torso of a Minerva, and several statues of Roman senators, including one supposed to represent Cicero. At the suggestion of Sir Richard Cotton, and in concert with two eminent scholars, Selden published *Marmora Arundeliana* (1628). An edition by Prideaux of the whole set of inscriptions, issued in 1676 under the title of *Marmora Oxoniensia, ex Arundelianis, Seldenianis,* &c., was republished with additional comments by Maittaire in 1732. In 1763 a new and splendid edition was published under the auspices of Dr. Chandler of Magdalen college, including ancient inscriptions collected by various learned travellers and engravings of 167 marbles, 103 of which belonged to the Pomfret donation. Among the other valued authorities on the subject is Böckh's *Corpus Inscriptionum Græcarum.*—The Arundel society in London, for the multiplication of fine chromotint copies of remarkable monuments of the old masters, was founded in 1849, and has given a wide and cheap circulation to works of art which had been previously accessible only to the rich.

ARUNDELIAN MARBLES. See ARUNDEL, THOMAS HOWARD.

ARUNDELL, Blanch, daughter of the earl of Worcester, and wife of Lord Thomas Arundell, died in 1649, aged 66. With only 25 men she for nine days defended Wardour castle against 1,300 of the parliamentary troops, and finally made an honorable surrender, the conditions of which were broken by the victors. Her tomb is in the chapel of the castle.

ARWIDSSON, Adolf Ivar, a Swedish poet, born at Padasjoki in Finland, Aug. 7, 1791, died at Viborg, June 21, 1858. He was instructed in history at the university of Abo, where he founded in 1821 the *Åbo Morgonblad*, a literary and political journal. This enterprise was unsuccessful, as the Russian government suppressed the publication in a few months, on account of its outspoken judgments of the acts of the authorities. Soon after this Arwidsson published a political essay in the *Mnemosyne*, which was of such a tone as to lead to his immediate banishment. He went to Sweden, secured a position in the royal library at Stockholm, was made its chief librarian in 1843, and continued in this office till his death. In the last years of his life the Russian decree of banishment against him was annulled, and it was while taking advantage of this to revisit Finland that he died. His principal works are: *Ungdoms Rimfrost* ("The Hoarfrost of Youth," Stockholm, 1832), a collection of poems; an excellent collection of Swedish folk songs under the title *Svenska Fornsånger* ("Ancient Swedish Songs," 3 vols., 1834-'42); *Stockholm förr och nu* ("Stockholm formerly and now," 1837-'40); and a translation of the Icelandic *Frithiofs Saga* (2d ed., Stockholm, 1841).

ARYAN RACE AND LANGUAGE. Arya (Sanskrit, *ârya ;* Zend, *âirya*) is a name by which the cultivated race of parts of S. W. Asia (Iran and India) anciently called itself, by way of distinction from the ruder aborigines by whom it was surrounded or among whom it had intruded itself; and the adjective Aryan is now commonly used to designate collectively the principal tongues and races both of the region indicated and of Europe. *Ariana*, *Iran*, *Iron*, and other kindred appellations, are derived from it; its own derivation is wholly obscure, and the various conjectures formed respecting it are not worth reporting here. Attempts have been made to trace it also in European use, but they have not been successful. It is, then, strictly applicable only to the Asiatic or Indo-Persian division of the family, and it is so applied by the great majority of German authorities, with many French, English, and others; while the whole family is styled Japhetic, or (oftenest by the Germans) Indo-Germanic, or Indo-European: it is doubtless the unwieldiness of the last two names that has given superior currency of late to Aryan.—The Aryan family of languages is divided into seven principal branches: 1, Germanic or Teutonic; 2, Slavo-Lithuanic or Letto-Slavic; 3, Celtic; 4, Italic (Latin, &c.); 5, Greek; 6, Iranian or Persian; 7, Sanskritic or Indian. That all the languages mentioned do really form one family together, as common descendants of a single original, is beyond all question; the correspondences which they exhibit, both of material and of structure, are such as admit of no other explanation. The comparative study of languages shows that there may be between any two even unrelated dialects a certain number of resemblances purely accidental; also, that one may borrow from another either single scattering words, or, under the influence of mixture of races or of influence exercised by conquest or by superiority of civilization, whole parts of a vocabulary; but only common descent can account for resemblances that reach even into, and are most conspicuous in, the whole series of numerals, the personal and other pronouns, the words of relationship, and the like; and, yet more, that reach into the apparatus of verb and noun inflection, and of derivation. On the other hand, there is no amount and degree of discordance which may not arise between languages originally one, but long separated and growing apart. The differences between English and Irish and Polish and Hindi are merely greater in amount and degree than between English and Dutch and German, covering up and disguising more effectually the common basis which really underlies the one series as well as the other, and making a more thorough and skilled search necessary to its discovery. By way of specimen of the correspondences of Aryan language, we give below the forms in all the branches of one word out of each class mentioned above:

English,	*three*,	*me*,	*mother*.
Slavic,	*tri*,	*man*,	*mater*.
Lithuanic,	*tri*,	*manen*,	*moter*.
Celtic,	*tri*,	*me*,	*mathair*.
Latin,	*tres*,	*me*,	*mater*.
Greek,	*treis*,	*me*,	*mêtêr*.
Iranian,	*thri*,	*me*,	*matar*.
Sanskrit,	*tri*,	*me*,	*matar*.

In verbal conjugation, relics of the original personal endings *mi*, *ti*, *si* in the singular, and *masi*, *tasi*, *nti* in the plural, are more or less distinctly traceable in all the branches, especially among the older dialects. It is needless to go further in this illustration: the comparative grammars of Bopp and Schleicher give a complete exhibition of the accordant groundwork and superstructure, phonetic and grammatical, of the whole body of languages included in the family; and a host of less comprehensive works show in like manner the connection of one and another branch with the rest.—It is held by those who have studied Aryan language most successfully, that its entire structure is developed out of monosyllabic elements, usually called roots. These were of two classes: predicative or verbal, indicating action or quality; and demonstrative or pronominal, indicating position or direction. By the combination of these two, especially, were grammatical forms made and parts of speech distinguished. The addition of pronominal endings to verbal roots made a verbal tense in three numbers (the dual perhaps of later origin than singular and plural, and mostly lost again in the later languages), with three persons in each. The prefixion of an "augment" (doubtless a pronominal adverb, meaning "then") made of this a past tense; but this augment-preterite has left only scanty and doubtful relics, except in Indo-Persian and Greek. Another past tense, or perfect, was formed by reduplicating the roots, apparently to signify completed action. This is the original of the Greek and Latin perfects, our ("strong" or irregular) preterite, &c. Futures were made later, with auxiliary verbs; one, from *i*, "go," apparently passed over into a modal use, as an optative, and was succeeded by another, from *as*, "be." A subjunctive mood, of more doubtful derivation, was added; and an imperative, probably limited at first to the second person. This, along with participles or verbal adjectives (for the development of distinct infinitives, verbal nouns, was probably later), appears to have been the whole primitive structure of the simple verb; a causative conjugation, besides, has had important developments in the derived tongues. The declensional inflection (of nouns, adjectives, and pronouns) distinguished also three numbers, and (including the vocative) eight cases in each number; or, besides the six we know in Latin, an instrumental, denoting *with* or *by*, and a locative, denoting *in*. Into this inflection was introduced further a distinction of sex: first, by the special characterization of a feminine; later, by the additional separation of a neuter (which in general differs from the masculine only in nominative, accusative, and vocative). From the original basis of sex, however, there was a very wide departure even in the primitive period, the system of grammatical gender becoming very complicated and artificial. The declension of pronouns was in many points irregular; there were as yet no relative pronouns, that order having grown later out of the demonstratives or interrogatives. Of the other parts of speech, the adverbs alone were a fully formed class; prepositions were still only adverbial prefixes to verbs; conjunctions were very few, and only the merest connectives, the construction of sentences being of the simplest character; articles did not come into existence till comparatively modern times. Numerals had been produced at least up to a hundred; as to *thousand*, the case is very doubtful. The apparatus of noun and adjective derivation, in both primary and secondary suffixes, was already elaborated in its principal features; conspicuous examples are the endings of comparative and superlative, and of participles.—This primitive structure of Aryan language has been variously modified, reduced, and added to, in the later history of the family; it was most fully and distinctly preserved in the Sanskrit, which on that account casts most light upon the common history of all; but there are points in which each branch leads the rest. On the whole, the tendency has been toward a reduction of earlier synthetic structure, and a prevalence of analytic methods of expression, by the substitution of prepositions for case-endings, and of auxiliaries for verb inflections, and by the multiplication of relational words. Of all the languages of the family, the English has gone furthest in this direction. Aryan language is called distinctively "inflective" (as is also Semitic, although its inflectiveness is of a very different character). By this is meant that it not merely forms combinations from elements originally independent, reducing one of them to a subordinate position, as "formative element," indicating a modification or relation of the other or radical element; but that it also peculiarly integrates or unifies the combined elements, losing sight of and disguising their separate individuality, and even allowing the radical part to become modified within itself by the addition of the other: thus, Sanskrit *vid*, *veda*, *vaidika;* Greek *λείπω*, *ἔλιπον*, *λέλοιπα*; Latin *fĭd*, *fīdo*, *fœdus;* English (where the endings have disappeared) *sing*, *sang*, *sung*, *song*. It is matter of dispute among linguists whether such changes are by origin purely phonetic, or symbolically significant: the former appears to be the better opinion.—The unity of Aryan language necessarily implies the former existence of a unitary Aryan people; that is, at some time in the past there must have existed somewhere in the world a single limited community, in whose use the language above described grew up and took shape, and by whose extension and separation it became so widely spread and so diversified as we find it actually to be; but when and where, it is impossible to say with any definiteness. The greatest antiquity we can attain in the history of the family is 3000–2000 B. C., when the Indians and Persians formed together one people. The oldest parts of the Vedas may be as old as 2000 B. C.; of the Avesta, considerably less. We have no trustworthy scale as yet with which to measure chronologically the changes of language; and our opinions of the time of Aryan unity must be governed greatly by our opinions as to the wider question of the antiquity of man; the former is variously estimated at from three up to five or ten thousand years before Christ. As to the place, current opinion is inclined to fix it on the highland of central Asia, near the head waters of the Oxus and Jaxartes; and this situation is claimed to be pointed out by the evidence of the language itself. That, however, is by no means the case; the mere fact that Indo-Persian language is less changed from original Aryan than is the speech of any other branch (which is all the linguistic evidence that can be alleged) does not at all prove that the Indo-Persian common abode is nearest to the original abode of the family; the changes of language are not dependent on and measured by emigration. It is in reality only the testimony of the Bible as to the place of origin of the whole human race, and the long-rooted opinions which have grown up partly under its influence, partly under that of the known growth and spread of civilization, that have led men to look to southwestern Asia as the cradle of the Aryan race and speech. Some recent scholars, rebelling against these influences, have fixed it rather in Europe; but there is nothing of definite value to say for this view. With reference, however, to the degree of cultivation reached by the Aryan mother tribe before its separation, more definite and trustworthy information is obtainable: by inference, namely, from the words which, as occurring in all or nearly all the branches, must be supposed to have formed a part of the primitive vocabulary. The items of such information were first put together by A. Kuhn; Pictet later produced an elaborate but uncritical and untrustworthy work on the subject; the last attempt at reconstruction of the Aryan vocabulary is by Fick. The main facts established are that the tribe was already far past savagery, having all the principal domestic animals that we have, practising the arts of weaving and agriculture, being acquainted with one or two metals (whether iron is not certain), and possessing some of the most important cereals; it was rather pastoral-agricultural than nomadic in its way of life.—It is, of course, vain to attempt tracing the history of dispersion and migration of the branches of the dismembered family into their present seats; but such dispersion must have taken place mainly by gradual spread and unconscious separation, not by a deliberate parting and marching off in different directions, as some seem to please themselves with fancying. Even the grade of kinship between the branches is not made out beyond dispute. That the Sanskrit-speaking race of India parted from the Iranians, on Iranian territory, and entered India by the northwest, not very long before the Vedic period, is, indeed, universally acknowledged. And the closer relationship of Greek and Italic, on the one hand, and of Germanic and Letto-Slavic, on the other, is quite generally held; but which of these two pairs stands nearer to the Asiatic is a matter of less unanimity of opinion, though with a preponderance to the side of the classic tongues. The place of the Celtic, again, is still more disputed: some connect it closely with the Italic, others rather with the Germanic, &c.; while yet others regard it as quite separate from all. These are matters which will doubtless be determined by and by; and their determination may throw more light than we have at present upon the general course of the movements of the family. There may have been other branches, as independent as the seven mentioned, but driven out of existence in the course of the historical changes that time has brought; it is doubtful whether the Albanian, or Shkipetar, is not a relic of such a branch, the Illyrian; after long doubt, the best authorities at the present time appear to set it down as Aryan. What other races may have earlier occupied a part of the present seats of the Aryans is also mainly matter for conjecture; but that the latter have encroached upon the domain of Finno-Hungarian ("Turanian") tribes in northern, and of Iberians (Basques) in southwestern Europe, does not admit of question. More or less of mixture with aboriginal races is a natural or unavoidable result of such wide extension; so that Aryan speech is likely to be everywhere purer than Aryan blood; and there may be nations or tribes in which, by successive intermixture, Aryan blood is in a minority, even a decided one; yet it is not at all to be questioned that, on the whole, the present geographical limits of the family have been reached by the growth and spread of the original Aryan community. No hypothesis of borrowing, or of the dominating influence of one tribe, propagating and imposing its own idiom through wide regions, can possibly explain the facts of the case; such influence is absolutely impossible without high culture, aided by literature and the art of writing, of which there are no traces in the pre-historic Aryan period.—One of the evidences that there is a unity of race as well as of language among the branches of the Aryan family, is the eminence, historical or literary, or both, which most of them have won among mankind. The family was far from being the first to rise to importance, but it has reached a higher place, and maintained itself there more persistently, than any other. The Persian empire may be regarded as the earliest appearance of an Aryan people as a leading actor in the drama of history; then Greek and Roman supremacy followed one another; and in the modern era, it is the European nations of this kindred, with their colonies, that have been and are almost monopolizing the progressive force of humanity. India has lived a more isolated life, but a grand and notable one; and, through Buddhism, it has powerfully influenced a great part of Asia. This historical importance of the Aryans constitutes one great source of the importance and interest belonging to the study of their languages. Another is the high rank of those languages themselves, as being confessedly the most perfect instruments of human expression and aids to human thought. Moreover, the immense range and variety of Aryan dialects, taken in connection with their high development and with the legibility of their history, have made the study of this family the training ground and the basis of general linguistic science.—For more detailed discussion of the matters presented here, see the "Lectures on Language" of Professors Max Müller and W. D. Whitney; the second volume of Duncker's *Geschichte des Alterthums;* Pictet's *Origines indo-européennes;* and Fick's *Vergleichendes*

Wörterbuch der Indogermanischen Sprachen. The last two, with Bopp's and Schleicher's comparative grammars, have been mentioned above. The relations of Latin and Greek respectively to the family have been best set forth by Corssen, *Lateinische Sprache*, and G. Curtius, *Griechische Etymologie.*

ARZACHEL, Abraham, a Jewish astronomer, born at Toledo, Spain, flourished about 1060. He wrote a work on the obliquity of the zodiac, and determined the apogee of the sun. The famous Alfonsine astronomical tables, prepared in 1252 by order of Alfonso X. of Castile, were derived in part from the writings of Arzachel. Several of his works are extant in Latin.

ARZAMAS, or **Arsamas,** a town of European Russia, capital of a district, in the government and 60 m. S. of the city of Nizhni Novgorod, on the Tyesha; pop. in 1867, 10,517. It is an old town, and has 34 stone churches, a fine cathedral built in 1812-'41, several convents, manufactures of silk, linen, iron, and leather, and two annual fairs.

AS, a Roman weight, equivalent to the *libra* of 12 ounces. It was also the name of a Roman brass coin, originally an *as* in weight, but reduced at successive times, until it weighed but half an ounce; it was stamped at first with the figure of a sheep, ox, or sow, afterward with the face of Janus, and a ship's prow.

AS, or **Asa** (Norse plur. *Æsir;* Ger. plur. *Asen*), in northern mythology, a member of the ruling race of gods, 12 male and 12 female, including Odin, Thor, Baldur, Freyr, Frigga, Freyja, Idunna, Eira, and Saga, who dwelt in Asgard. (See MYTHOLOGY.)

ASA, the third king of Judah, reigned 41 years, about 957-916 B. C. He was the son and successor of Abijam, and great-grandson of Solomon. He distinguished himself by his opposition to the forms of idolatry which had become prevalent in the preceding reigns. Being assailed by Zerah, an Ethiopian king, with an immense army, Asa won a complete victory, and for ten years enjoyed peace. Then he became involved in a war with Baasha, king of Israel, and, at the cost of the accumulated treasures of the temple, induced the king of Damascus to enter into alliance with him. His reign was upon the whole a prosperous one. He was succeeded by his son Jehoshaphat.

ASAFŒTIDA (also called *stercus diaboli* and *cibus deorum*), a resinous gum derived from the root of the *narthex asafœtida*, a plant of the family *umbelliferæ*, which grows in Persia, Afghanistan, and neighboring regions. It yields all its virtues to alcohol. Triturated with water, it forms a white or pink milky emulsion. Its peculiar property is its strong disagreeable odor and taste. This resides in the volatile oil it contains, which may be separated by distilling the aqueous or alcoholic solution. The oil is said to contain from 15·75 to 23 per cent. of sulphur. Asafœtida is used in Persia as a condiment for flavoring sauces and food. The leaves are eaten and the root roasted for the same purpose. It is used in medicine as an expectorant and antispasmodic or nervous stimulant. It is supposed to act beneficially in hysteria, flatulence, and some spasmodic affections of the respiratory organs. (See ANTISPASMODICS.) The volatile oil is undoubtedly absorbed, as is shown by the odor being perceptible in the breath and other excretions.

Narthex asafœtida.

ASAPH, a Levite, appointed by David as leading chorister in the musical services which he organized in connection with divine worship. The duty thus assigned him descended by a certain succession in his family, constituting them a kind of order parallel with the priesthood, though not equal to them in dignity or influence. The "children of Asaph" appear still in the times of Ezra and Nehemiah as holy singers. Asaph is called in Chronicles a seer (*hozeh*), and twelve psalms (l. and lxxiii.-lxxxiii.) are attributed to him. Another Asaph was chancellor of King Hezekiah.

ASBEN, in Africa. See AIR.

ASBESTUS (Gr. ἄσβεστος, a substance unaffected by fire, from ἀ privative and σβέννυμι, to quench), a term used rather to denote a peculiar form assumed by several minerals than to designate any particular species. Tremolite, actinolite, and other forms of hornblende, excepting those containing much alumina, pass into fibrous varieties, the fibres of which are sometimes very long, fine, flexible, and easily separable by the fingers, and look like flax. These kinds, like the corresponding mineral pyroxene, are called asbestus. Pliny supposed it to be a vegetable product, although good for making incombustible cloth, as he states. The *amianthus* of the Greeks and Latins was the same thing; the word meaning undefiled, and alluding to the facility of cleaning the cloth by throwing it into the fire. The colors vary from white to green and wood-brown. The name amianthus is now applied usually to the finer and more silky kinds. Mountain leather is a kind in thin flexible sheets, made of interlaced fibres, and mountain cork the same in thicker pieces; both are so light as to float on water, and they are often hydrous. The individual crystals of asbestus are easily separated from each other, are very flexible and elastic, and have a fine silky lustre. A single fibre fuses into white enamel glass; but in the mass it is capable of resisting ordinary flame, and has hence been extensively applied in the manufacture of fire-proof roofing, flooring, steam packing, clothing, and lamp wicking. The ancients were familiar with its incombustibility, and wove a cloth out of it for the purpose of wrapping up the bodies of the dead when exposed on the funeral pile; they also made napkins of it, which were cleaned by throwing them into the fire; and they employed the finer varieties for the wicking of votive lamps. Gloves for handling hot iron and firemen's clothing have been made of it in Bohemia and France; and at one time it was thought that an important industry would grow out of this application, but experience has developed some practical difficulties, and asbestus fabrics are now a curiosity. The use of this material for a non-conducting envelope of steam pipes, for fire-proof roofing, and for safes, bids fair to become extensive.—Asbestus occurs abundantly in Switzerland, Italy, Scotland, on the island of Corsica, on Staten Island, and in numerous other localities. A magnesian-iron hornblende called anthophyllite frequently occurs as a bowlder on the island of New York, and has been found *in situ* at the corner of 59th street and 10th avenue.

ASBURY, Francis, the first bishop of the Methodist Episcopal church ordained in America, born at Handsworth, Staffordshire, England, Aug. 20, 1745, died at Spottsylvania, Va., March 31, 1816. At the age of 14 he was apprenticed to a mechanic; but through the influence of the Methodist preachers who visited his father's house, he was led at the age of 16 to commence his labors as a local preacher. In 1767 he joined the itinerant ministry, and after three years of home service was sent in 1771 as missionary to America, and the next year was appointed by John Wesley general assistant in America. He reinvigorated the itinerant system, and sent missionaries into wide ranges of country to preach and found new societies. On the outbreak of the revolutionary war, many of the clergy of the church of England and some of the Methodist preachers returned to England. Among the latter, in 1778, went T. Rankin, who had succeeded Asbury as general assistant. Asbury resolved to remain in America. In common with many others, he was from conscientious scruples a non-juror. From this cause, and from the effect of Mr. Wesley's "Calm Address, &c.," Asbury and his Methodist coadjutors were regarded with suspicion by the struggling colonists, and often molested in their work; his prudence however at length allayed prejudice. On the return of peace it was deemed expedient to establish an independent Methodist Episcopal church for America. Accordingly, on Sept. 2, 1784, Thomas Coke was duly ordained by Mr. Wesley and two other English presbyters superintendent of the Methodist societies in America, with instructions to ordain Asbury as joint superintendent. On Dec. 27, 1784, after unanimous election by the American preachers, he was inducted into office. For more than 30 years his personal history is the history of the progress and development of Methodism in America. In middle life he was of robust frame, of medium stature, with a fresh and healthful countenance, and a keen, penetrating eye that told of his wonderful insight into character. Though not privileged with the culture of the university, he had acquired a moderate knowledge of the Greek and Hebrew languages. In connection with Coke, he devised a plan for a complete system of academic and collegiate education, and as early as 1785 laid the foundations for the first Methodist college in America. As an organizer and administrator Asbury was only inferior to Wesley, by whom he had been instructed, and much of whose spirit he had imbibed. During his American ministry he travelled over 270,000 miles through the entire extent of the country; he preached about 16,500 sermons, or nearly one each day for 45 years; he presided at 224 annual conferences, and ordained more than 4,000 preachers. The organization, discipline, and marvellous progress of Methodism were largely due to the sagacity, administrative ability, and untiring activity of Asbury. Through the itinerant system, of which he was the reinvigorator and life-long illustrator, the spiritual destitution of our pioneer population was relieved. He was never married. His only literary works are his "Journals" (3 vols. 8vo), an invaluable record of his remarkable life.

ASCALON (Heb. *Ashkelon;* Arab. *Askalan*), one of the five leading or princely cities of Philistia, was situated midway between Gaza and Ashdod, on the Mediterranean, about 37 m. S. W. of Jerusalem. Though several times mentioned in the poetical books of the Scriptures, it figured less conspicuously in the early history of the Hebrews than in that of the Maccabees and the crusades. It was twice taken by Jonathan the Asmonean, was the scene of a great victory of the Christians under Godfrey and Tancred in 1099, was taken by Baldwin III., king of Jerusalem, in 1153, and was recaptured by Saladin in 1187. By treaty between Richard and Saladin (1192) it was destroyed jointly by the Mussulmans and Christians. The wine of Ascalon is celebrated by Pliny. Near the town stood in antiquity a famous temple of Derceto, the Syrian Venus, of which, however, no trace remains now. Altogether, as Zephaniah predicted, Ascalon has become "a desolation."

ASCARIDES (Gr. ἀσκαρίς), a term used by Hippocrates, and now applied to several nematoid worms which infest the intestines of man and animals: the *ascaris vermicularis*, mawworm or pin worm, which infests the rectum or lowest intestine; the *tricocephalus dispar*, or long thread worm, found in the cæcum or upper part of the large intestines; the *A. lumbricoides*, or large round worm, mostly found in the small intestines. The body of the large round worm is long, elastic, and fusiform, or apering at the two extremities; the anterior being somewhat obtuse and furnished with three tubercles, which surround the mouth. (See ENTOZOA.)

ASCENSION, a S. E. parish of Louisiana, intersected by the Mississippi river and bounded N. E. by the Amite river and E. by Lake Maurepas; area, 420 sq. m.; pop. in 1870, 11,577, of whom 7,310 were colored. The parish consists chiefly of an alluvial plain. A great part of the land is subject to frequent inundations, and is extremely fertile, particularly on the banks of the river.* In 1870 the parish produced 160,542 bushels of Indian corn, 981 bales of cotton, 15,926 lbs. of rice, 6,423 hhds. of sugar, and 308,587 gallons of molasses. Capital, Donaldsonville.

ASCENSION DAY, a festival of the Roman Catholic and Episcopal churches, kept in commemoration of the ascension of Jesus, recorded by the evangelist to have happened on the 40th day after his resurrection. It is kept on Thursday, and the day is also called Holy Thursday. It has been observed at least since A. D. 68. In the 5th century Mamertus, bishop of Vienne, instituted a three days' preparation for this festival. This occupies the three days immediately preceding Holy Thursday, which are called rogation days.

ASCENSION ISLAND, an island about 8 m. in length and 6 in width, lying in the south Atlantic ocean, in lat. 7° 56′ S., lon. 14° 25′ W. It is of volcanic formation, mountainous, and was barren and uninhabited until the imprisonment of Napoleon at St. Helena, when it was occupied by a small British force, who have continued to cultivate and improve it. Its shores supply a vast number of turtles. It serves as a depot and watering place for ships.

ASCH, a town of Bohemia, situated near the frontiers of Saxony and Bavaria, 14 m. N. W. of Eger; pop. in 1869, 9,405. It is the seat of an important industry, especially in silk and woollen goods. Formerly the "dominion of Asch," embracing an area of 41 sq. m., was an immediate territory of the German empire; in 1331 it was made a fief of the Bohemian crown, but received in return a promise of a perpetual exemption from taxes; its entire incorporation with Bohemia did not take place till 1770.

ASCHAFFENBURG, a city of Bavaria, in the circle of Lower Franconia, on the right bank of the river Main, which is here crossed by a handsome stone bridge, 23 m. E. S. E. of Frankfort; pop. in 1871, 9,212. It has a fine palace, the Johannisburg, formerly the residence of the electors of Mentz. Among the other notable buildings are the Stift's Kirche, erected in 980, and the Pompejanum or Pompeian house, which Louis I. built from 1842 to 1849 in imitation of the house of Castor and Pollux at Pompeii. Aschaffenburg was a town as early as the 8th century, and in the middle ages often appears in history. During the war between Prussia and Austria, in 1866, an engagement took place at Aschaffenburg on July 14, in which the Austrians were defeated, and 2,000 of their troops were cut off from retreat and captured in the city.

ASCHAM, Roger, an English scholar, born in Yorkshire in 1515, died Dec. 30, 1568. He was of humble parentage, and was brought up by Sir Anthony Wingfield, with whose sons he was educated. In 1534 he graduated at St. John's college, Oxford, where he gained a fellowship. Ascham early embraced Protestant principles. In 1537 he became a college tutor, and was appointed by the university to read Greek in the public schools. When Henry VIII. founded a Greek lectureship Ascham was appointed to it, and in 1544 was made university orator, a post which obliged him to prepare all addresses and write the complimentary and business letters to great men. For this his elegant Latinity particularly qualified him. In 1548 Ascham was appointed teacher of learned languages to the lady Elizabeth, afterward queen. He continued in her household two years, when he quitted her suddenly from a pique against persons in her establishment. In 1550 he was appointed secretary to Sir Richard Morysine, the English ambassador to the emperor Charles V., which appointment he retained for three years, until the death of Edward VI. and the ambassador's recall. While abroad, he travelled in Germany, visited Italy, and wrote the results of his travels in "A Report and Discourse of the Affaires of Germany." On his return in 1553 he was appointed Latin secretary to the queen, and on the death of Mary he was continued in his office by Elizabeth, who required his services as tutor in the languages, in which he read with her several hours each day. He wrote a small treatise on archery, entitled "Toxophilus," and dedicated it to Henry VIII., who ordered him an annual pension of £10 for it. He also wrote "The Scholemaster," a treatise on the study of languages, which was first published by his widow. His letters to Oxford during his stay abroad were also collected and published. His works were published entire, Oxford, 1703, and his English writings, London, 1815, with a life by Dr. Johnson.

ASCHERSLEBEN, a town of Prussia, in the province of Saxony, about 32 m. S. by W. of Magdeburg, on the river Eine; pop. in 1871, 16,734. It has manufactures of woollen and linen. In the middle ages the counts of Ascania (a district including the present circles of Aschersleben, Ermsleben, and Ballenstedt) resided here, and the ruins of their castle are still in existence on the neighboring Wolfsberg.

ASCIDIANS. See MOLLUSCOIDS.

ASCLEPIADES, called from his native country Bithynus, a physician, born at Prusa in Bithynia in the 2d century B. C., flourished in Rome in the early part of the 1st. He first studied rhetoric and philosophy, but afterward abandoned them for the study of medicine. Though his system contains some rules approved by modern science, such as reliance upon gentle measures, diet, fresh air, &c., he seems to have attained success rather by indulging the whims and caprices of his patients, flattering their prejudices, and caring for their comfort, than by any ability of his own. After successful practice in several Grecian cities, he went to Rome, where he gained great fame and wealth. He is said never to have been ill, and to have died at a great age by an accident. He left several disciples, who attained considerable prominence as teachers of his doctrines.

ASCOLI. **I.** A city (anc. *Asculum Picenum*) of central Italy, capital of the province of Ascoli Piceno, on the right bank of the Tronto, 18 m. W. of the Adriatic and 87 m. N. E. of Rome; pop. about 11,000. It is well built, and has a citadel, a Jesuit college, a museum, library, and a number of private palaces. Its harbor, Porto d'Ascoli, at the mouth of the Tronto, is defended by two forts, and is frequented by coasting vessels. **II. Ascoli Piceno,** a province of central Italy, formerly belonging to the papal territory, and now constituting one of the four provinces of the Marches; area, 808 sq. m.; pop. in 1872, 203,009. Part of the province is traversed by branches of the Apennines and by numerous valleys watered by the Tenna, Aso, Tesino, Tronto, and other rivers. The chief products are corn, wine, oil, honey, silks, wool, and fish. **III. Ascoli di Satriano** (anc. *Asculum Apulum*), a town of S. Italy, in the province of Capitanata, situated on the E. slope of the Apennines, 65 m. E. N. E. of Naples; pop. about 6,000. Near it Pyrrhus in 279 B. C. gained a great victory over the Romans; and in 1190 Count Andrea, general of the emperor Henry VI., was defeated here by Tancred and slain. The ancient town was on a branch of the Appian way, and considerable remains exist outside the modern town.

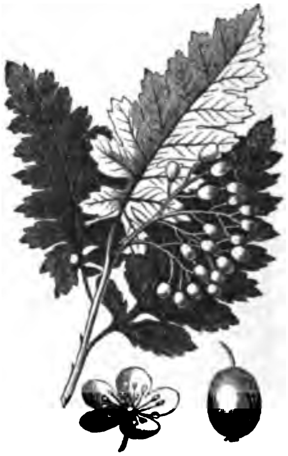
ASCOT HEATH, a race course in Berkshire, England, 26 m. from London and 6 m. from Windsor, near the London and Southwestern railway. The annual meeting in June is one of the principal events of the turf. The first prize is a gold cup valued at £500.

ASELLI, or **Asellio, Gasparo,** an Italian anatomist, born in Cremona about 1580, died in Milan in 1626. He was professor of anatomy in the university of Pavia. In 1622, while demonstrating the recurrent laryngeal nerves by the dissection of a dog, he first observed the lacteal vessels as a congeries of white cords disseminated through the mesentery; and on opening one of them with the point of the scalpel, the milky chyle flowed out, and the discovery of the absorbent vessels was accomplished. Before that period the mesenteric veins were supposed, as in the time of Galen, to collect from the intestines all the nutritious products of digestion and to carry them to the liver, where they were worked up into the perfected blood, and the blood thence disseminated, through the rest of the venous system, outward to the whole body. A part of the blood only, passing to the heart and lungs, was thought to be arterialized, and so sent out through the arteries from the left ventricle, as the venous blood was sent out through the veins. The discovery of Aselli consisted simply in finding a new set of mesenteric vessels which took up from the intestines the chyle alone, and conveyed it toward the central organs. He did not detect their real ultimate course, but supposed them to terminate in the liver, which still remained the supposed organ for the elaboration and perfection of the blood. It was only some years later (see PECQUET) that the independent course of the lacteals and lymphatics was ascertained, passing through the receptaculum chyli and the thoracic duct to the left subclavian vein. Aselli, however, was the pioneer in this discovery, and the subsequent success of others depended on the facts demonstrated by him. They are embodied in his dissertation *De Lactibus sive Lacteis Venis* (Milan, 1627).

ASGILL, John, an English lawyer and writer, born about 1655, died in London in 1738. After acquiring considerable reputation in London in his profession and as a political and legal pamphleteer, he went to Ireland in 1699, where he was elected to the Irish parliament. Before taking his seat, however, he was expelled, Oct. 11, 1703, for blasphemy in his pamphlet on the possibility of avoiding death, "An Argument proving that, according to the Covenant of Eternal Life revealed in the Scriptures, Man may be translated hence into that Eternal Life without passing through Death" (London, 1700), which was publicly burned. Returning to London in 1705, he was elected in 1707 to the English house of commons; but he was also expelled from this for the same cause. He passed the last 30 years of his life in prison for debt, continuing to transact professional business, and publishing numerous pamphlets.

ASH, a name applied to four genera of forest trees. I. *Fraxinus* (Gr. φράξις, separation, from the wood being used for fences, or from the facility with which it splits), of the family *oleaceæ*, Juss., *diœcia diandria*, Linn. Polygamous, calyx minute, 3 to 4 cleft; corol deeply 4-parted or none. Stamens 2 to 4; pistillate flowers; ovary superior, compressed, 2-celled, with 2 ovules each; capsule with a membranaceous lanceolate wing (*samara*), 1-seeded by abortion; seed pendulous. Most of the species are indigenous in North America (more than 30 E. of the Mississippi), many in Europe, few in Asia (one in Nepaul). Most are large trees, affecting shady and moist places, banks of rivers, or marshes; they prosper less in barren and bleak localities. The wood of most species is tough and elastic, and is used by wheelwrights, carriage-makers, and ship-builders, for many purposes. The most important species are the following: *F. acuminata* (*Americana*, *discolor*, white ash); leaves pinnatifid, leaflets petiolate, oblong, 3 to 4 pairs and 1 odd one, acuminate, shining, entire or slightly toothed, glaucous beneath, downy when young; grows 60 to 75 feet high. This furnishes the best wood of all. It flourishes from Canada to Carolina, and is believed to be an antidote to snake poison. *F. sambucifolia* (black or water ash); leaves large; leaflets 7 to 9 pairs and 1 odd, sessile, ovate, lanceolate, rounded at base, rugose, shining and smooth above, villous beneath on the veins; 60 to 66 feet high. *F. tomentosa* (*pubescens*, red ash); leaflets 7 to 9 pairs and 1, elliptic, acuminate, nearly entire, very long; petioles and young branches downy. It furnishes good wood, more reddish than that of the others. *F. juglandifolia* (*viridis*, swamp ash); leaves very large, leaflets 4 pairs and 1, petiolate, ovate, serrate, glaucous beneath, pubescent on veins; a small tree. Michaux and Nuttall describe 7 more species and some varieties, among which *F. quadrangulata* (blue ash), of Tennessee and Kentucky, attaining 70 feet in height, with valuable wood, and *F. Oregona*, attaining 80 feet, are the most remarkable. In Europe the principal species is *F. excelsior* (common ash), attaining 90 feet, with excellent wood, though inferior to the *Americana*. On its leaves swarm *cantharides* (Spanish flies), spreading a disagreeable smell. A variety with drooping branches (weeping ash) is grafted on tall stems, and converted into an arbor shading all around. II. *Ornus* (Gr. ὀρεινός, mountainous) of Persoon (*fraxinus ornus*, Linn., flowering ash), of the same family with *fraxinus*, but of the class *diandria monogynia*, Linn. Calyx 4-parted; corolla 2 or 4-parted, segments long, ligulate; stamen inserted, with 2 barren filaments; stigma emarginate; fruit winged, 1-celled, 1-seeded; leaves opposite, unequally pinnate; flowers in terminal or axillary panicles. It grows in shady woods in Europe, N. Asia, and America. Among the American species, *O. dipetala* and *O. Americana* are most remarkable. In Europe, *O. rotundifolia* exudes the *manna*, a sweet substance which differs from sugar by not fermenting with water and yeast, and serves as a purgative medicine. The best manna is collected in Calabria and Sicily. The lilac and olive can be successfully grafted on the species of *fraxinus* and *ornus*. The cultivated species of *ornus* are often grafted on *fraxinus excelsior;* and as *ornus* grows the more rapidly, a curiously protuberant stem is formed, and may by alternate grafting be made to take grotesque shapes. III. *Sorbus* (its bark being supposed to be an absorbent in consumption), of the family *pomaceæ*, Juss., *icosandria* 2–5 *pentagynia*, Linn., classed under the genus *pyrus*. Calyx tubulous, urceolate, limb 5-parted; petals roundish; styles 2 to 5; drupe closed, 5-celled, with cartilaginous putamen; cells 2-seeded. The species are: *P.* or *S. Americana* (mountain ash); leaves pinnatifid; leaflets oblong, lanceolate, acuminate, somewhat serrate; common petiole very smooth; flowers white, in terminal corymbs; fruit globose, yellowish red, persistent almost all winter. It grows in Canada and the northern states. *P. microcarpa* (small-fruited) extends from New York into Carolina; smaller than the preceding; fruit scarlet. *S. aucuparia* (rowan tree), common in the forests of N. Europe; grows up to 25 feet; fruit edible, after being frost-bitten and kept in hay for some time. The fruit of other species also affords food to many birds. Only one species (on the Sandwich islands) is known in the tropical regions. The fruits of many contain malic acid, and the flowers, bark, and root of *aucuparia* yield hydrocyanic (prussic) acid.

Mountain Ash.



Oak-leaved Mountain Ash.

The wood is valuable for many uses, and the branches were employed by the Druids in their rites. IV. *Xanthoxylum* (Gr. *ξανθός*, yellow, and *ξύλον*, wood), of the family *xanthoxylaceæ*, Juss., *diœcia pentandria*, Linn. *X. Carolinianum* (prickly ash, toothache tree), a middle-sized tree with prickly branches. *X. macrophyllon* (*pterota*, bastard ironwood), in Arkansas and Florida; from 15 to 20 feet high. This species, as well as others (called yellow wood, satin wood, &c.) of much greater size, have hard, cross-grained wood.

ASH, John, an English Baptist divine, born in 1724, died in 1779. He was pastor of a congregation at Pershore, in Worcestershire, and published "A New and Complete English Dictionary" (2 vols. 8vo., London, 1775).

ASHANTEE, the most notable of the existing savage kingdoms on the W. coast of Africa. Its boundaries are not accurately defined; but approximately the kingdom may be considered the region fronting the Gold Coast, between lat. 5° and 10° N. and lon. 1° and 6° W. Until the commencement of the present century Ashantee was unheard of by Europeans, for the Fantees, a hostile tribe, occupied the coast. In 1807 Osai Tutu was king of Ashantee. He appears to have subjugated many of the neighboring tribes. Two of his tributary chiefs having fled to the Fantee country, Osai demanded that they should be given up to him. The demand was refused, and the Ashantee messengers were put to death. Osai thereupon made an incursion into the Fantee country, which he ravaged down to the coast. The British, who had a fort at Anamboe on the coast, undertook to shelter the flying Fantees. The Ashantees invested the fort and compelled the British governor to ask for peace. This peace was of brief duration. In 1817 the Ashantees again invaded the Fantee country, and took possession of it, their acquisition by right of conquest being recognized by the British governor of the fort. In 1823 the Fantees, encouraged by the British, rose against the Ashantees, who again marched into their country. Sir Charles McCarthy, the British governor of the Gold Coast, undertook to chastise the invaders. A sharp action took place, Jan. 21, 1824, in which the British were defeated, the commander and nearly all his officers being killed. The victorious Ashantees came near capturing the British stronghold of Cape Coast Castle; but sickness coming on, they were obliged to withdraw to their own country. Since that time the Ashantees have kept aloof from the seaboard, but appear to have extended their dominion into the interior. Now and then travellers have made their way to Koomassie, the Ashantee capital, in lat. 6° 51′ N., lon. 2° 16′ W. They report that the government is an absolute despotism. The king is the great property owner, and is the legal heir of all his subjects. Slavery exists on a large scale, many of the nobles having as many as 1,000 slaves. Up to within a few years the slave trade prospered and gave a large income to the masters; but now that the trade has declined, slavery seems likely to die out. Polygamy may be considered the special institution of Ashantee. The importance of a man is measured by the number of his wives; for these are the cheapest laborers. The king, it is said, is limited to 3,333 wives, who during the working season are scattered over his plantations. While at home in the capital they occupy two streets, where they are secluded from all but the king and his female relatives; any other person who looks upon one of them, even by accident, is punished by death. As to their religion, human sacrifices seem to constitute the distinguishing feature. The soil is fertile, producing every kind of tropical grains and fruits. The abundance of gold displayed as ornaments shows that mines are common; many of the richest, however, are held sacred to the divinities, and so not worked. Among the special industries may be mentioned a beautiful fabric of cotton, woven in strips four inches wide, and afterward sewn together. A considerable commerce is carried on between Koomassie and Hoossa, Bornoo, Timbuctoo, and other points in the interior; the principal exports are gold dust and ivory. The population is estimated to reach, or even to exceed, 3,000,000. (See GOLD COAST.)

ASHBURTON, Alexander Baring, baron, an English merchant and statesman, born Oct. 27, 1774, died May 13, 1848. He was the second son of Sir Francis Baring, who sent him to the United States, where he married in 1798 the eldest daughter of William Bingham of Philadelphia. After his return to England, he published in 1808 a pamphlet relating to the orders in council and to the conduct of Great Britain toward the neutral commerce of America, which passed through several editions. From a partner he became on the death of his father in 1810 the head of the house of Baring, and was a member of parliament from 1812 to 1835, when, after having been for four months president of the board of trade and master of the mint, he was raised to the peerage under the title of Baron Ashburton, which had become extinct in 1823 on the death of his first cousin. (See DUNNING, JOHN.) In the house of commons he had opposed the reform bill, and in the house of lords he opposed the repeal of the corn laws. The unsettled condition of the northeastern boundary question led Sir Robert Peel to send him on a special mission to the United States, where he concluded, Aug. 9, 1842, the so-called "Ashburton treaty." It was assailed by the opposition in England, led by Lord Palmerston, as the "Ashburton capitulation;" and in the United States, Mr. Webster was charged with having been overreached; but public opinion on both sides of the water has sanctioned it as a satisfactory adjustment of difficult matters of controversy, some of which had embarrassed the relations of the two countries for 60 years.

The extraordinary compliment of a vote of thanks for a diplomatic achievement was paid to Lord Ashburton, on the motion of Mr. Hume in the house of commons, and of Lord Brougham in the house of lords; and an earldom was offered to him, which he declined. The negotiations were facilitated by his high character and intelligence, by his amiable disposition, and by his excellent personal relations with Daniel Webster, then secretary of state, one of whose grandsons was named after him. Lord Ashburton was a privy councillor, a trustee of the British museum, and D. C. L. of Oxford. Talleyrand at one time confided to him the custody of his memoirs, and presented him with Canova's bust of Napoleon. He died at the country seat of his daughter Harriet, the widow of the marquis of Bath. His wife, who was a woman of superior accomplishments, died about six months after him.—His eldest son, WILLIAM BINGHAM BARING, Lord Ashburton, who was a member of parliament for 17 years and held various official positions, died March 23, 1864; and his brother FRANCIS, the 3d baron, died Sept. 6, 1868. The present and 4th baron, ALEXANDER HUGH BARING, is the son of the latter.

ASHBY DE LA ZOUCH, a market town of Leicestershire, England, 15½ m. N. W. of Leicester; pop. 3,800. It is a place of resort for its salt-water baths, and has an ancient church and the remains of a fine castle, in which Mary queen of Scots was once imprisoned.

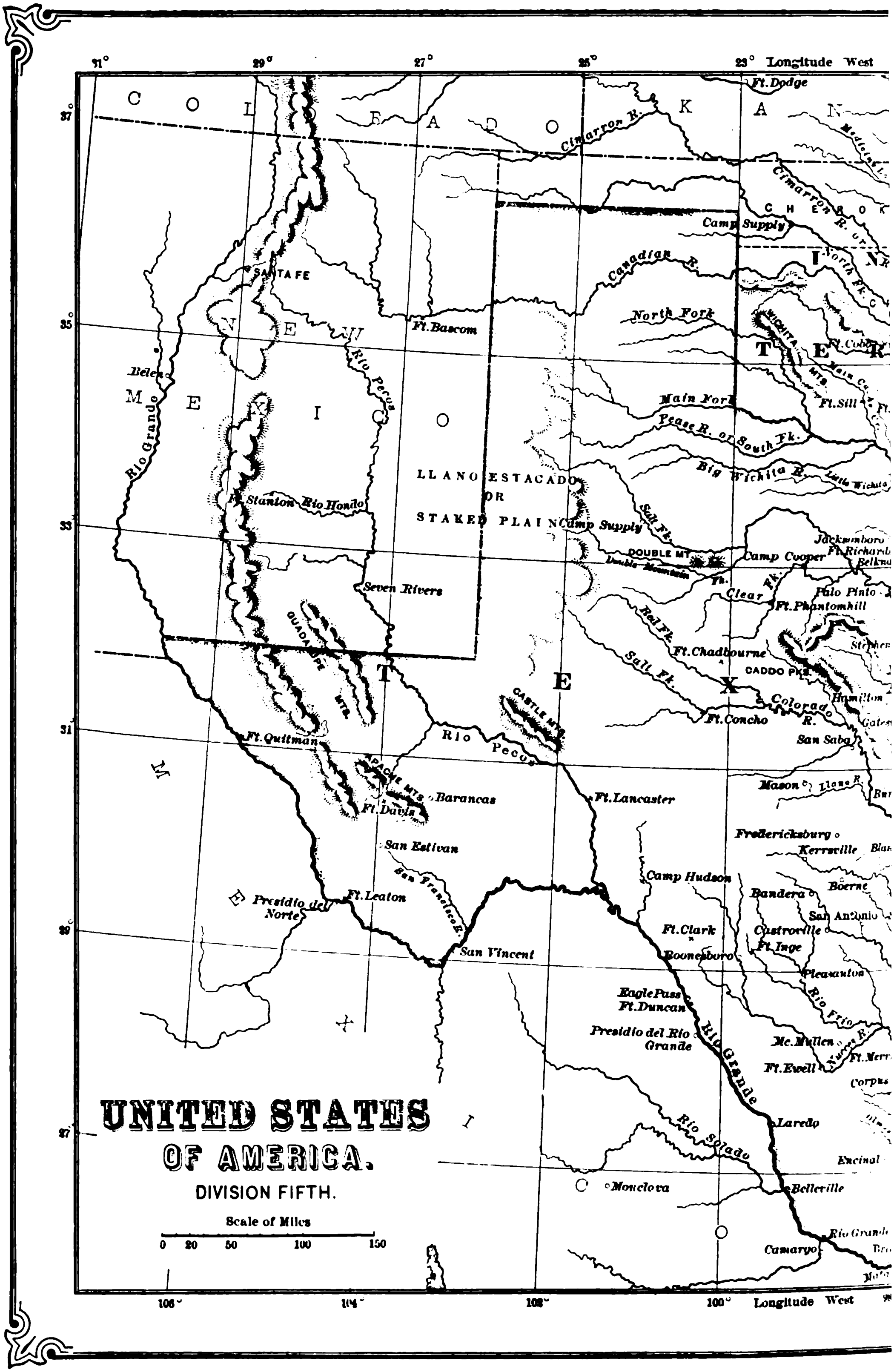
ASHDOD (the *Azotus* of the Greeks and Romans; now called *Esdud*), one of the five chief Philistine cities on the Mediterranean coast, lying midway between Ascalon and Ekron, about 10 miles from each. It is 21 m. S. of Jaffa, and 32 W. of Jerusalem. Its Hebrew name signifies a stronghold, and as it lay in the only practicable route between Egypt and Assyria, its possession was of great importance in all the wars between those powers. The Hebrews were never able to hold it for more than a brief period. About 715 B. C. it was taken by the Assyrians, and 85 years later was retaken by the Egyptians, after a siege by Psammetichus which Herodotus states to have lasted 29 years. It remained a place of some consequence 1,000 years more, for Azotus was the seat of a bishopric, the incumbent of which had a place at the councils of Nice and Chalcedon. In the time of Jerome, about A. D. 400, it was a small unwalled town. Travellers of the last century describe it as an inhabited site, marked by ancient ruins, such as broken arches and partly buried fragments of marble columns, with what appears to be an ancient khan, the principal chamber of which has been used as a Christian church. This ruined khan, to the west of the present village, marks the site of the acropolis of the ancient town, and the grove near it alone protects the site from the shifting sand of the adjoining plain, which threatens to overwhelm the spot.

ASHE, a N. W. county of North Carolina, bordering on Virginia and Tennessee, bounded E. and S. E. by New river; area, about 300 sq. m.; pop. in 1870, 9,573, of whom 582 were colored. It is a mountainous region, with portions good for grazing, but is generally not fertile. In 1870 the county produced 16,341 bushels of wheat, 32,311 of rye, 120,545 of Indian corn, 42,350 of oats, and 23,211 lbs. of wool. Capital, Jefferson.

ASHE, John, an officer in the war of the American revolution, born in England in 1721, died in North Carolina in October, 1781. He was six years old when his father emigrated to America and took up his abode in Newton, now Wilmington, N. C. He was several times a representative in the colonial assembly, of which body he was speaker from 1762 to 1765, and is said to have been the first to suggest the provincial congress, in which he occupied a prominent position. He joined the army at the first outbreak of hostilities, led a force to destroy Fort Johnson in 1775, and as brigadier general took part in the movements of Lincoln on the Savannah in 1778 and 1779. In the latter year he suffered a severe defeat at the hands of Gen. Prevost, at Brier Creek. He was made a prisoner in 1781, but was released on parole.

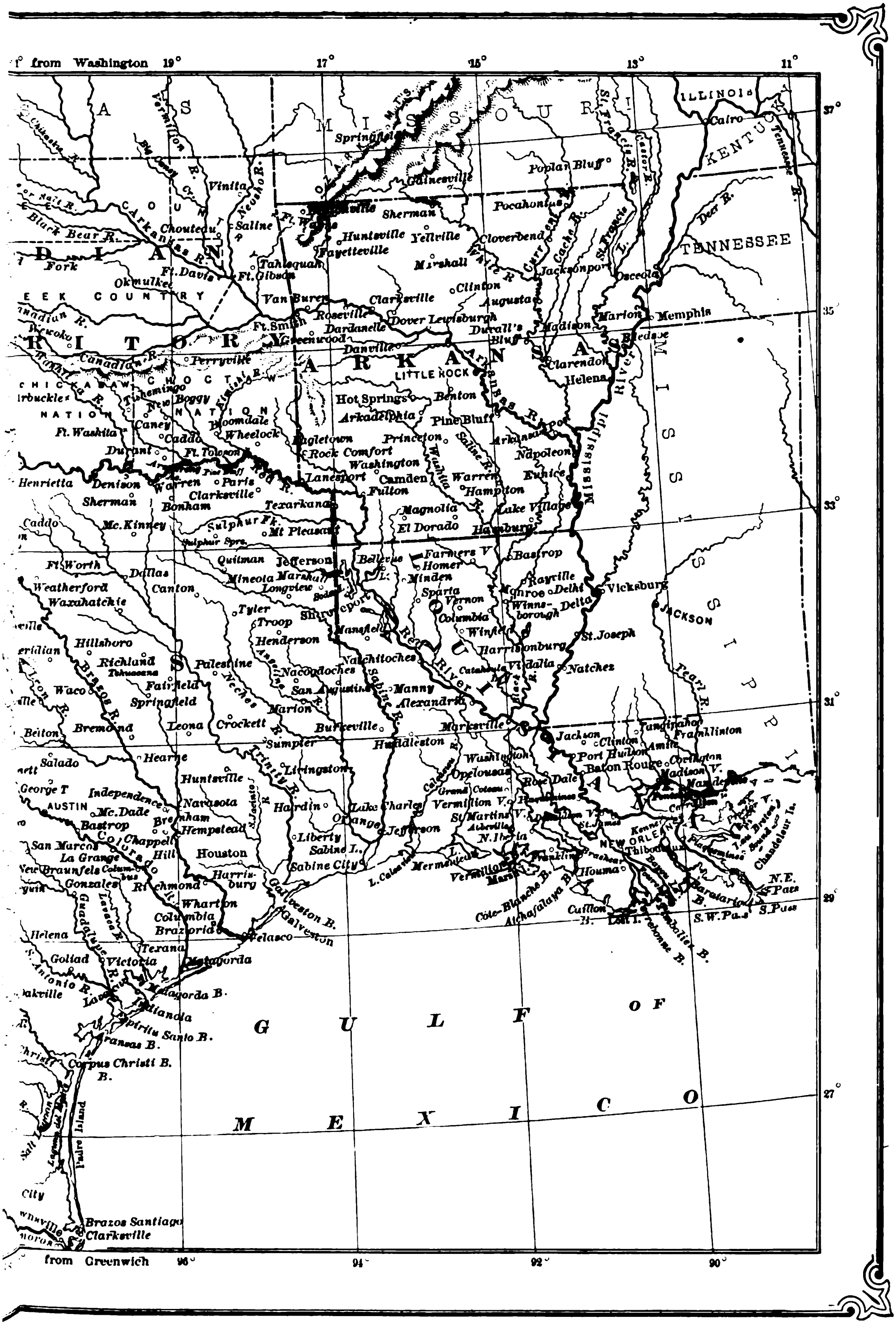
ASHER, the eighth of the sons of Jacob, and the second by Zilpah, the handmaid of Leah. The name signifies "happy." The tribe of Asher at the exodus numbered 41,500 males over 20 years of age, being exclusive of Levi the ninth in order of number, Ephraim, Manasseh, and Benjamin only being below it. Before entering Canaan, the numbers of the tribe had increased to 53,400, making it the fifth. The territory allotted to the tribe of Asher was on the seashore, from Carmel northward, with Manasseh on the S., Zebulon and Issachar on the S. E., Naphtali on the E., and Syria on the N. Its assigned N. boundary on the seashore was a little N. of Sidon; but the Asherites were unable to expel the Sidonians and the other Phœnicians within their limits, with whom they appear to have lived on friendly terms. Their territory contained some of the most fertile portions of Palestine, including a part of the great valley of Esdraelon. Asher and Simeon were the only tribes W. of the Jordan which furnished no judge or hero to Israel. In the time of David the tribe had become so insignificant that it is omitted from the list of the chief rulers; and in the time of Hezekiah it is mentioned with a kind of surprise that some from the tribe of Asher came up to the passover at Jerusalem.

END OF VOLUME FIRST.



UNITED STATES OF AMERICA.

DIVISION FIFTH.


from Washington
19°
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MISSOURI
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KENTUCKY
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ARKANSAS
MISSISSIPPI
LOUISIANA
INDIAN TERRITORY
CHOCTAW NATION
CHICKASAW NATION
CREEK COUNTRY
GULF OF MEXICO
Springfield
Gainesville
Poplar Bluff
Cairo
Pocahontas
Sherman
Huntsville
Fayetteville
Yellville
Cloverbend
Marshall
Clinton
Augusta
Jacksonport
Osceola
Vinita
Chouteau
Saline
Tahlequah
Ft. Gibson
Ft. Davis
Okmulkee
Van Buren
Ft. Smith
Clarksville
Roseville
Dover
Lewisburgh
Dardanelle
Greenwood
Danville
Perryville
Marion
Memphis
Madison
Duvall's Bluff
Clarendon
Helena
LITTLE ROCK
Hot Springs
Benton
Arkadelphia
Pine Bluff
Princeton
Tishemingo
New Boggy
Boomdale
Wheelock
Caney
Caddo
Ft. Washita
Durant
Ft. Towson
Eagletown
Rock Comfort
Washington
Lanesport
Camden
Fulton
Warren
Hampton
Napoleon
Eunice
Lake Village
Hamburg
Magnolia
El Dorado
Texarkana
Henrietta
Denison
Sherman
Paris
Clarksville
Bonham
Mc.Kinney
Sulphur Fk.
Sulphur Sprs.
Mt Pleasant
Jefferson
Marshall
Longview
Quitman
Mineola
Ft. Worth
Dallas
Weatherford
Waxahatchie
Canton
Tyler
Troop
Henderson
Shreveport
Bellevue
Farmers V
Homer
Minden
Sparta
Vernon
Columbia
Bastrop
Rayville
Monroe
Delhi
Winnsborough
Delta
Vicksburg
JACKSON
Mansfield
Winfield
Harrisonburg
St. Joseph
Natchez
Vidalia
Natchitoches
Nacogdoches
San Augustine
Manny
Alexandria
Marion
Burkeville
Marksville
Hillsboro
Richland
Palestine
Fairfield
Springfield
Waco
Bremond
Leona
Crockett
Sumpter
Huddleston
Livingston
Hearne
Belton
Salado
Huntsville
Navasota
Independence
Mc.Dade
AUSTIN
Bastrop
Brenham
Hempstead
Hardin
Lake Charles
Orange
Jefferson
Vermillion V.
Opelousas
Washington
Grand Coteau
St. Martins V.
Abbeville
N. Iberia
Franklin
Houma
Thibodaux
Baton Rouge
Port Hudson
Clinton
Jackson
Tangipahoa
Franklinton
Amite
Covington
Madison V.
Mandeville
Rose Dale
Plaquemine
St. James
NEW ORLEANS
Donaldson V.
San Marcos
La Grange
New Braunfels
Columbus
Gonzales
Chappell Hill
Houston
Richmond
Harrisburg
Wharton
Columbia
Brazoria
Velasco
Galveston
Galveston B.
Liberty
Sabine L.
Sabine City
Mermentau
Vermillion
L. Calcasieu
Calcasieu
Cote Blanche B.
Atchafalaya B.
Caillou B.
Last I.
Terrebonne B.
Timbalier B.
Barataria B.
Plaquemines
Chandeleur Is.
N.E. Pass
S.W. Pass
S. Pass
Helena
Goliad
Victoria
Texana
Matagorda
Matagorda B.
Indianola
Espiritu Santo B.
Aransas B.
Corpus Christi B.
Corpus Christi
Laguna del Madre
Padre Island
City
Brownsville
Matamoros
Brazos Santiago
Clarksville
Arkansas R.
Canadian R.
Red R.
Red River
Neosho R.
Verdigris R.
Black Bear R.
Cimarron R.
Washita R.
Blue R.
Ouachita R.
Saline R.
White R.
Black R.
Current R.
Cache R.
St. Francis R.
Castor R.
Mississippi River
Deer R.
Tennessee R.
Ozark Mts.
Kiamichi R.
Sabine R.
Neches R.
Angelina R.
Trinity R.
S. Jacinto R.
Brazos R.
Colorado R.
Leon R.
Lavaca R.
Guadalupe R.
S. Antonio R.
Pearl R.
Bayou La Fourche
Lake Pontchartrain
Lake Borgne
Grand L.
Catahoula L.
Boeuf R.
Tensas R.

UNIV OF M

SUPPLEMENT TO VOLUME I.

ABBE, Cleveland, an American physicist, born in New York city, Dec. 3, 1838. He graduated at the New York Free Academy in 1857, and, after teaching mathematics in the Trinity Latin school for one year, went to the university of Michigan, where he studied astronomy under Brünnow and taught the higher course in mechanics in the scientific school of the university. From 1860 to 1864 he resided at Cambridge, Mass., where he was employed by the astronomer, Dr. B. A. Gould, upon the telegraphic longitude work of the United States coast survey. The years 1865 and 1866 he spent at the imperial observatory of Pulkova, near St. Petersburg, Russia, as the guest of that institution; and, after a short stay at the Washington observatory, he was in 1868 chosen director of the Cincinnati observatory. His plans for its enlargement included terrestrial physics so far as that study bears upon astronomy, and led him to propose, in May, 1868, that Cincinnati should be made the centre of an extensive system of daily meteorological observations and reports. The chamber of commerce promptly accepted his proposition to furnish daily weather predictions based upon the telegraphic despatches received every morning. Accordingly, on Sept. 1, 1869, he began the publication of the "Weather Bulletin of the Cincinnati Observatory," which contained the first systematic weather predictions published in America, and was only discontinued on the commencement of the publications of the army weather bureau in November, 1870. His directorship of the Cincinnati observatory ceased with the transfer of that institution, in 1872, to the scientific department of the university of that city. The interest taken in the subject of weather predictions and storm-warning signals found expression in a joint resolution of congress, signed by the president Feb. 9, 1870, in which it was resolved, "That the secretary of war be and he hereby is authorized and required to provide for taking meteorological observations at the military stations in the interior of the continent, and at other points in the states and territories of the United States, and for giving notice on the northern lakes and on the sea coast, by magnetic telegraph and marine signals, of the approach and force of storms." The execution of this work was immediately intrusted by the secretary of war to the chief signal officer of the army, Gen. A. J. Myer, who in January, 1871, called to his assistance Prof. Abbe as his meteorologist, upon whom devolved the duty of issuing the official weather predictions or "probabilities" and storm warnings. This work was carried on by him uninterruptedly three times a day (morning, evening, and midnight) for about a year, until others could be trained to serve as a relief. The subsequent important publications of the army signal office, such as the "Monthly Weather Review" and the "Bulletin of International Simultaneous Observations," were also begun under his supervision. Among his more important publications upon astronomical matters are the following: "Parallax of Sirius, from Observations at the Cape of Good Hope" ("Monthly Notices Royal Astron. Soc.," 1867); "Distribution of the Nebulæ" ("Monthly Notices Royal Astron. Soc.," 1867); "Report on the Distribution of Standard Time" (Cincinnati, 1870); "Observations of the Solar Corona during the Total Solar Eclipse of August, 1869" ("American Journal of Science," 1872); "Observations on the Tail of Coggia's Comet" ("Astronomische Nachrichten," 1874); "The very much extended Nebulæ" ("American Journal of Science," 1875); "Observations of the Corona: Solar Eclipse, July 29, 1878"; and "Report on Standard Time to the American Meteorological Society" (New York, 1880). In relation to meteorology he has published: "Sun Spots and Terrestrial Temperatures" ("American Journal of Science," 1870); "Historical Note on Systems of Weather Telegraphy" ("American Journal of Science," 1871); "Suggestions as to the Practical Use of

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Weather Maps" (Washington, 1871); "The Nova Scotia Cyclone of August, 1873;" "The Altitudes of Signal Service Stations;" "List of Auroras reported by Signal Service Observers, from Nov. 11, 1870, to July 31, 1873;" "The Aurora of April 7, 1874;" and "Meteorological Influences on Grasshoppers, and Theory of their Migrations" (Washington, 1878). He has also prepared the articles on meteorology in this Cyclopædia, and chapters on astronomy and meteorology in Baird's "Annual Record of Science and Industry" for 1873–'8.

AFGHANISTAN. Lord Cranbrook, British secretary of state for India, in a memorandum addressed to Lord Lytton, governor general of India, asserted that the original cause of the war of 1878–'9 lay in the refusal of Mr. Gladstone's government to guarantee to Shere Ali, the ameer, protection against Russian aggression after the capture of Khiva by the Muscovite forces in 1873. From the date of that refusal the ameer had assumed an attitude of sullen reserve toward England, and he had even left untouched a sum of money granted to him by the Indian government. On the other hand, the opponents of Lord Beaconsfield's government asserted that a quarrel had been deliberately forced upon the ameer in order that the Indian government might secure a "scientific frontier." The military authorities held that, with Afghanistan in coldly neutral or hostile hands, India was indefensible; and that whichever of the two powers, Russia or England, possessed the Afghan table lands, could choose her own time for making war on the other. To be sure, the negotiations between them in 1872–'3 had resulted in a declaration by Russia that Afghanistan lay beyond the field of her influence, and that the Oxus, from Lake Sirikol to Balkh, was to form the N. frontier of Afghanistan; but in 1878 Gen. Kaufmann, the Russian commander in Turkistan, sent a numerous military embassy, headed by Gen. Stolietoff, to Cabool, where it was received in a flattering manner by Shere Ali. The ameer had steadfastly refused to permit a British agent to reside at his capital, or to receive an envoy even temporarily, on the ground that he could not protect him from his turbulent subjects. The object of Gen. Stolietoff's mission was ostensibly the establishment of Russian agencies in the northwest of Afghanistan, and the opening of a regular trade between that country and Russia. The Indian government at once resolved to force an English mission upon the ameer; and an embassy, at the head of which were Sir Neville Chamberlain and Major Louis Cavagnari, deputy commissioner of Peshawer, escorted by a fighting force of 300 men, and including all told about 1,000 persons, was despatched from Peshawer. On Sept. 22 the embassy was turned back at Fort Ali Musjid, in the Khyber pass, by an officer of the ameer, who crowned the heights with troops and threatened to fire upon it if it advanced further. Lord Lytton immediately issued an order for the concentration of troops on the Afghan frontier, and on Nov. 1 addressed an ultimatum to Shere Ali, demanding an apology and the privilege of sending an envoy to Cabool. A reply was required by Nov. 20, but it was not received until some time after hostilities had begun, and proved unsatisfactory. It complained of British interference in Afghan affairs, alluding particularly to the intercession in the case of "my undutiful son, that ill-starred wretch Mohammed Yakub Khan," and professed a willingness to receive a temporary embassy with an escort of 20 or 30 men. At 3 A. M. on Nov. 21 Gen. Roberts's advanced guard crossed the Kurum river and occupied the Afghan hamlet of Kapuyan. Lord Lytton next day issued a proclamation, announcing that his government had no quarrel with the sirdars or people of Afghanistan, but only with Shere Ali, and that the independence of the country would be respected, but declaring that the Indian government could not tolerate the interference of any other power in the internal affairs of Afghanistan. The plan of the campaign involved the advance of three armies, each comprising not far from 7,000 men, respectively by the Khyber pass upon Cabool, by the Kurum valley upon Ghuznee, and, in the south, upon Candahar from Quettah in Beloochistan, which had been occupied by the British in 1876, in accordance with a clause of the treaty of 1854. To oppose these armies, the ameer had a force of about 50,000 fighting men and perhaps 100 serviceable cannon. The first division of the Khyber pass army, under Gen. Sir Samuel Browne, occupied Fort Ali Musjid, after a short bombardment, on Nov. 22, and two days afterward was in Dakka, at the inner or Afghan entrance to the pass, which had been deserted by the enemy. Gen. (now Sir Frederick) Roberts, advancing through the Kurum valley, met with no opposition until he reached the Peiwar pass, to which the Afghans had fallen back from the Kurum fort. Here a sharp battle was fought in the first two days of December, the Afghans handling their guns very well; but the result was a complete victory for the British, who thereafter found the Shutargardan pass before them free of the enemy. A motion in parliament of a want of confidence in the conduct of the ministry, which had resulted in the war, was rejected on Nov. 9 by 227 to 338 votes. Russia, impelled either by a desire to remain on peaceful terms with England or by the unsatisfactory condition of her own internal affairs, now withdrew her Cabool embassy, and Shere Ali, despairing of success against the English, and probably in hope of securing Russian assistance by a personal appeal to the emperor, withdrew with it to Turkistan. His subjects, who have never paid any ruler more allegiance than suited their own convenience, had become more turbulent than ever. Before his departure they compelled him to release Yakub Khan, who had quarrelled with his father because

Abdullah Jan, a younger son by a favorite wife, had been named by Shere Ali for the succession, and in 1874 had been lured into Cabool on a safe conduct and put into prison, where he had been confined ever since, although Abdullah had died in August, 1878. Yakub now acted as ameer. The march of Gen. Browne from Dakka over the plain of Jelalabad was unopposed, and the town of Jelalabad, famous as the scene of Gen. Sale's stand in 1842, was occupied on Dec. 20, the notables coming out to extend a friendly reception to the British. On Dec. 26 Gen. Roberts, in an assemblage of Afghan chiefs at the Kurum fort, proclaimed the annexation to India of the Kurum district, including the valleys of Khost and Dawar; and on Jan. 1 he entered the fortress of Matoon, the capital of Khost, which was surrendered by the Afghan governor. The Quettah column, advancing through the Khojak pass under Gens. Donald, Stewart, and A. S. Biddulph, routed the enemy in a skirmish on Jan. 6, and a few days afterward occupied Candahar. Shere Ali died at Mazar-i-Sherif, on the Balkh frontier, on Feb. 21; and on receipt of the news Yakub Khan announced it to the British authorities. A number of chiefs had come into their camps, and attempts to negotiate with Yakub as his father's successor were now made, but with so little success that preparations were made for a further advance. During their course 40 men of the 10th hussars were drowned while crossing the Cabool river—a heavier loss to the English than they were accustomed to suffer in battle. But they suffered severely from disease, and were constantly harassed by the marauding tribes of the hills, who frequently threatened to cut their lines of communication. On May 8 Yakub Khan arrived in Gen. Browne's camp at Gundamuk, midway between Jelalabad and Cabool—the scene of the massacre of the last survivors of Gen. Elphinstone's retreating army in 1842. Here a treaty was negotiated between the ameer and Major Cavagnari, by the terms of which the former granted amnesty to such of his subjects as had sided with the British during the war, and agreed to conduct his relations with foreign states according to the wishes of the English government, which was to assist him against foreign aggression. A British resident was to be received at Cabool, and agents were to be permitted to visit the Afghan frontier whenever considered necessary by their government. British subjects were to be allowed to trade in Afghanistan, commerce was to be facilitated, and a line of telegraph was to be constructed at the expense of the British government from Kurum to Cabool. Candahar and Jelalabad, and all the country occupied by the invading armies, were to be restored to the ameer, except the districts of Kurum, Pishin, and Sibi, which were to remain under the administrative control of Great Britain, but not to be considered as permanently severed from Afghanistan. Their revenues, less the costs of administration, were to be paid to the ameer, and he was also to receive a subsidy of six lacs of rupees ($277,000) annually. The Indian government was to retain in its own hands the control of the Khyber and Michni passes, between Jelalabad and Peshawer, and all relations with the independent tribes in those regions. England thus obtained her "scientific frontier," and the control of the three great highways from India to central Asia. The treaty was signed on May 26, 1879, and before the expiration of the month the British troops had begun to retire within the assigned limits. Major Cavagnari was sent to Cabool as the British resident, and was knighted for his services, as Sir Alexander Burnes had been 40 years before. The parallel was to be carried to a tragical completion, for on Sept. 3 three of the ameer's Heratee regiments, whose pay was in arrears, mutinied, and, with a large number of the people of the city, attacked the residency. Sir Louis Cavagnari, Lieut. Hamilton, and the guard of about 70 men made a brave resistance, but were slaughtered almost to a man. The residency was sacked, and the bodies of the Englishmen were treated with indignity. The three British columns once more advanced from the Khyber pass, through the Shutargardan pass, and upon Candahar, respectively. The second of these forces, under Gen. Roberts, after brisk fighting in the pass, defeated the Afghans at Charasiab before Cabool on Oct. 6, and six days later occupied the capital. Yakub Khan, after sending piteous messages to the British, had stolen out of the city and joined them before the end of September. Whether he was responsible for the massacre, beyond his incapacity to restrain his followers, has never been very clearly ascertained; but the most reasonable theory is, that he was willing the resident should be intimidated into leaving Cabool. He returned to the city with the British, resigned his throne, and was sent to India as a state prisoner. Gen. Roberts treated the Caboolese and tribesmen with severity, large numbers being hanged, most of them upon alleged evidence of complicity in the massacre. Among those executed were the chief religious and police functionaries of Cabool. The Afghans gathered in great force under their chiefs, and repeatedly attempted to cut off the British lines of communication, succeeding so far that that by way of the Shutargardan was abandoned, and communication by the Khyber opened. A force of 10,000 under one Mohammed Jan, who had suddenly risen from a subaltern of artillery to a position of considerable importance, maintained itself so firmly on the hills south of the city, that Gen. Roberts, after two or three days of indecisive fighting, abandoned Cabool and fortified himself in the Shirpur cantonment, two miles N. E. of the city. Here he was attacked on Dec. 23 by a force of 25,000 Afghans; but a part of his army made a sally that resulted in the complete rout of the enemy, and two days later he occupied the city and citadel, having meanwhile been heavily reënforced from the Khyber column. Early in 1880 negotiations were opened with Abdurrahman, a brother and ancient enemy of Shere Ali, who was now returning from Turkistan as a pretender to the Afghan throne. Having accepted the conditions of the British, he was on July 22 solemnly proclaimed ameer of Cabool. Candahar had been constituted a separate state, under British protection. Against it Ayub Khan, governor of Herat, a brother of Yakub, marched with a large army, and on July 27, at Kushk-i-Nakhud, he overwhelmed a British brigade, commanded by Gen. Burrows. Its remnants returned to Candahar, where Gen. Primrose prepared for a siege, which soon began. To relieve him, as well as the isolated garrison of Kelat-i-Ghilzai, Gen. Roberts was sent from Cabool, with 10,000 men of all arms, while the force of Gen. Phayre, commanding at Quettah, was also directed upon Candahar. At the same time Gen. Stewart, with the remainder of the Cabool army, began a return march to India. Gen. Roberts brilliantly accomplished his task. In about 23 days he marched 316 m. unopposed, picking up the garrison of Kelat-i-Ghilzai in his way, and entering Candahar, from which Ayub had withdrawn, on Aug. 31. On Sept. 1 he stormed Ayub's position at Mazra, and totally dispersed his army. Ayub, with few companions, fled toward Herat, his Caboolese followers returning to submit to Abdurrahman.

AKKAS, a race of dwarfs living in the valley of the White Nile, S. of the Welle river, beyond Monbuttu-land, about 3° N. of the equator. They are probably related to the Dokkos, who inhabit the same region. Schweinfurth describes them as never exceeding 5 ft. in stature, with small feet and hands and protruding chins. They hunt the elephant, and use the bow and the lance with great skill. Other accounts represent them as less warlike and less dwarfish, and in some danger of extinction by their more powerful neighbors. Two Akka children who were brought to Europe by Miani are said to be fairly intelligent.

ALABAMA. The population of the state, according to the federal census of 1880, is shown in the following table:

COUNTIES.	POPULATION.			COUNTIES.	POPULATION.		
	Total.	White.	Colored.		Total.	White.	Colored.
Autauga	13,108	4,397	8,710	Henry	18,761	11,994	6,767
Baldwin	8,603	4,390	8,675	Jackson	25,114	21,074	4,038
Barbour	33,979	13,091	20,884	Jefferson	23,272	18,219	5,053
Bibb	9,487	5,887	3,600	Lamar [9]	12,142	9.967	2,173
Blount [1]	15,369	14,210	1,159	Lauderdale	21,035	14,173	6,860
Bullock [2]	29,066	6,944	22 119	Lawrence	21,392	12,642	8,750
Butler	19.649	10,684	8,965	Lee	27,262	12,217	15 041
Calhoun [3]	19,591	14,134	5,457	Limestone	21,600	11,637	9,963
Chambers	23,440	11.364	12,075	Lowndes	31,176	5.645	25,528
Cherokee	19.108	16,418	2,690	Macon	17,371	4,587	12,784
Chilton [4]	10.793	8,651	2.142	Madison	37,625	18,591	19,034
Choctaw	15,731	7,390	8,341	Marengo	30,890	7,277	23,612
Clarke	17,806	7,718	10,096	Marion	9,364	8,841	523
Clay [5]	12,938	11.870	1,068	Marshall [10]	14.585	13,084	1.496
Cleburne	10.976	10.308	668	Mobile	48,653	27,187	21,443
Coffee	8,119	6,881	1,238	Monroe	17,091	7,780	9,284
Colbert	16,153	9,203	6,950	Montgomery [11]	52,356	13,457	38,899
Conecuh	12,605	6,224	6,380	Morgan [12]	16.428	11,758	4,670
Coosa	15,113	10,050	5,059	Perry	30.741	7,150	23,591
Covington	5,639	4,968	671	Pickens	21.479	9,132	12,347
Crenshaw	11,726	9,118	2,608	Pike	20,640	14,368	6,272
Cullman [6]	6,355	6,312	43	Randolph	16.575	13,155	3,420
Dale	12,677	10,553	2.122	Russell	24,837	6,182	18,655
Dallas [7]	48,433	8,425	40,007	St. Clair	14,462	11,621	2,834
De Kalb	12.675	11,993	682	Shelby	17,236	12.258	4,968
Elmore [8]	17,502	8,747	8,755	Sumter	28,728	6.451	22,277
Escambia	5,719	4,106	1,590	Talladega [13]	23.360	10,856	12,504
Etowah	15,398	12,896	2,502	Tallapoosa	23,401	16,103	7,298
Fayette	10,135	8,873	1,262	Tuscaloosa	24,957	15,216	9,741
Franklin	9,155	8,079	1,076	Walker	9.479	8,978	501
Geneva	4,342	3,829	513	Washington	4,538	2.807	1,729
Greene	21,931	3,765	18,165	Wilcox	31,823	6,711	25,117
Hale	26,553	4,903	21,650	Winston [14]	4,253	4,236	17
The state					1,262,505	662,185	600,103

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[1] In 1877, part to Cullman.

[2] In 1877, part from Montgomery.

[3] In 1858 name changed from Benton to Calhoun.

[4] Since 1870 name changed from Baker to Chilton; in 1875, part from Dallas.

[5] In 1877, part to Talladega.

[6] In 1877, from parts of Blount, Marshall, Morgan, and Winston.

[7] In 1875, part to Chilton.

[8] In 1877, part from Montgomery.

[9] Since 1870, name changed from Sanford to Lamar.

[10] In 1877, part to Cullman.

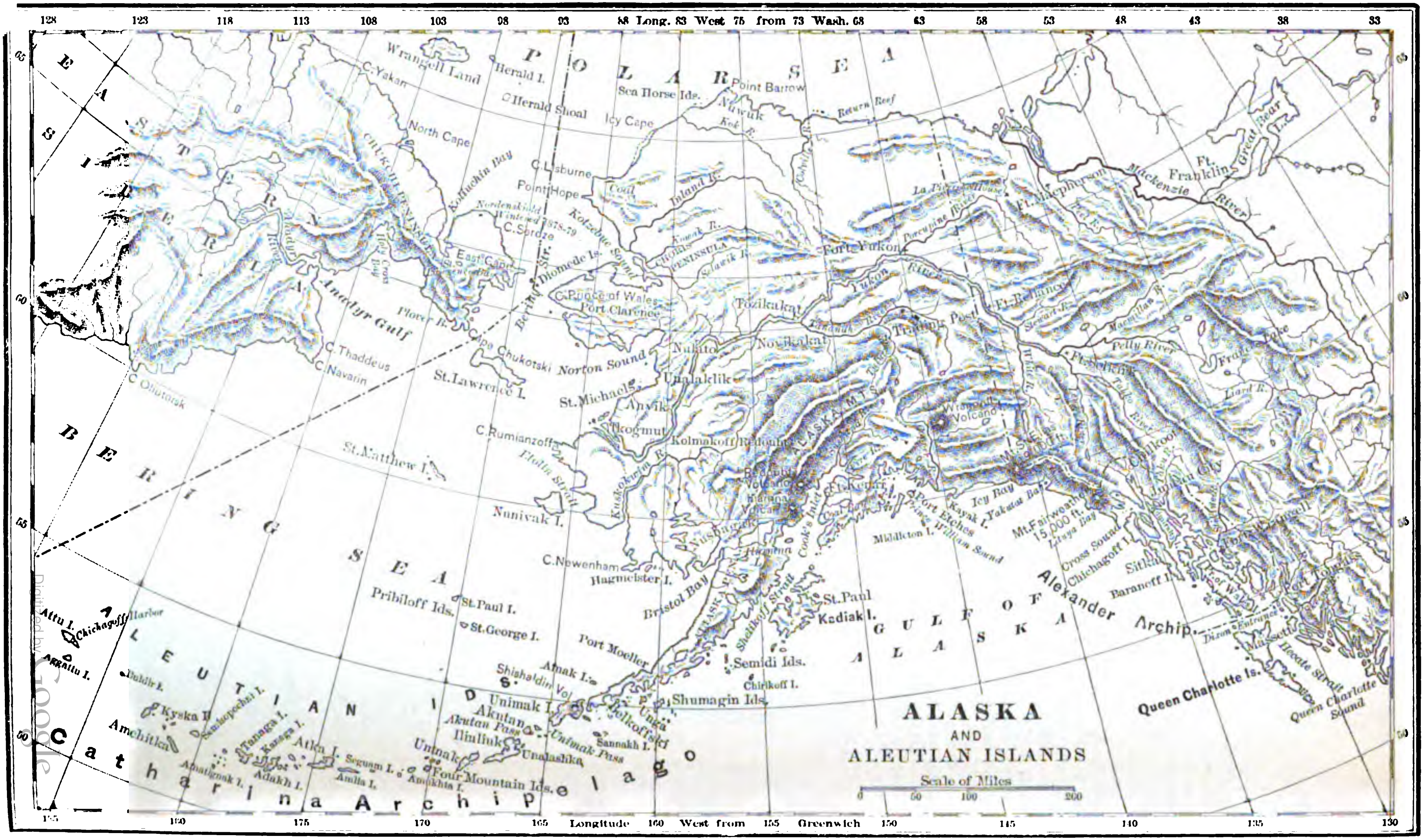
[11] In 1877, parts to Bullock and Elmore.

[12] In 1821 name changed from Cataco to Morgan; in 1877, part to Cullman.

[13] In 1877, part from Clay.

[14] In 1850 name changed from Hancock to Winston; in 1877, part to Cullman.

There were 141,461 white and 118,423 colored males 21 years of age and over. The number of horses on farms was 113,950; mules and asses, 121,081; working oxen, 75,534; milch-cows, 271,443; other cattle, 404,213; sheep, 347,538; swine, 1,252,462; manufacturing establishments, 2,070; capital, $9,668,008; hands, 10,019; value of materials used, $8,470,-


ALASKA
AND
ALEUTIAN ISLANDS
Scale of Miles
0
50
100
200
Long. West from Wash.
Longitude West from Greenwich
POLAR SEA
BERING SEA
GULF OF ALASKA
ALEUTIAN IDS.
Catharina Archipelago
SIBERIA
Wrangell Land
Herald I.
Herald Shoal
Point Barrow
Sea Horse Ids.
Icy Cape
C. Lisburne
Point Hope
Kotzebue Sound
Bering Str.
Diomede Is.
East Cape
C. Prince of Wales
Port Clarence
Norton Sound
St. Michaels
St. Lawrence I.
C. Chukotski
Anadyr Gulf
Anadyr River
C. Thaddeus
C. Navarin
C. Olutorsk
North Cape
C. Yakan
Kolyuchin Bay
Holy Cross Bay
Plover B.
St. Matthew I.
C. Rumianzoff
Etolin Strait
Nunivak I.
C. Newenham
Hagmeister I.
Bristol Bay
Pribiloff Ids.
St. Paul I.
St. George I.
Port Moeller
Amak I.
Shishaldin Vol.
Unimak I.
Akutan
Akutan Pass
Iliuliuk
Unalashka
Unmak Pass
Umnak
Four Mountain Ids.
Seguam I.
Amlia I.
Atka I.
Adakh I.
Tanaga I.
Kyska I.
Amchitka
Attu I.
Chichagoff Harbor
Agattu I.
Buldir I.
Shumagin Ids.
Semidi Ids.
Chirikoff I.
Kadiak I.
St. Paul
Shelikoff Strait
Cook's Inlet
Alaska Pen.
Alaska Mts.
Yukon River
Fort Yukon
Nulato
Unalaklik
Anvik
Ikogmut
Kuskokwim R.
Kolmakoff Redoubt
Nushagak
Tozikakat
Novikakat
Trading Post
Ft. Reliance
Ft. Selkirk
Pelly River
White R.
Wrangell Volcano
Porcupine River
La Pierre's House
Ft. McPherson
Mackenzie River
Ft. Franklin
Great Bear L.
Peel R.
Stewart R.
Macmillan R.
Frances Lake
Liard R.
Chilkoot
Juneau City
Taku R.
Mt. St. Elias
Mt. Fairweather 15,000 ft.
Lituya Bay
Yakutat Bay
Icy Bay
Kayak I.
Port Etches
Prince William Sound
Middleton I.
Cross Sound
Chichagoff I.
Sitka
Baranoff I.
Alexander Archip.
Prince of Wales I.
Fort Tongass
Dixon Entrance
Queen Charlotte Is.
Masset
Hecate Strait
Queen Charlotte Sound
Colville R.
Inland R.
Kowak R.
Selawik R.
Chukotsk Peninsula
Noatak
Return Reef
Kok R.
Coal
Nordenskiöld Wintered 1878-79
C. Serdze
Sannakh I.
Unga
Belkofski

205; products, $13,565,504. The mining of coal has increased from 10,000 tons in 1872 to 400,000 tons in 1881. According to the census of 1880, the state produced 699,654 bales of cotton, 25,451,278 bushels of corn, 3,039,639 of oats, and 1,529,657 of wheat. The debt settlement provided for by the act of Feb. 23, 1876, has been practically completed. There yet remain outstanding a few of the old bonds, for which provision is made. As they come in, new bonds, bearing interest from the date of issue, are exchanged for them. It is probable that most of those still out are lost or destroyed. In two years, but $146,300 of the new bonds, of all classes, have been issued. The total bonded debt, including $253,500 of eight per centum bonds held by the Agricultural and Mechanical college, is now $9,407,800, on which the interest charge is $343,929. There will be no further increase in the rate of interest on any class of bonds until January, 1887, when class A bonds will advance to four per centum. By means of the improvement of Mobile bay, which has just been completed by the United States government, a vessel drawing 23 ft. may now enter the lower bay and find secure anchorage, and a vessel drawing 17 ft. may pass direct to the city.—The population of the most important cities in 1880 was: Mobile, 29,132; Montgomery, 16,713; Selma, 7,529; Huntsville, 4,977. See map in supplement to Volume VII.

ALASKA, formerly Russian America (till purchased from Russia by the United States, for $7,250,000, in 1867), a territory bounded on the E., in the terms of the treaty of cession, as follows: Beginning at the southernmost point of Prince of Wales island, which point lies in the parallel of 54° 40′ N. lon. and between the 131st and 133d degree of W. longitude (from Greenwich), the said line shall ascend to the north along Portland channel as far as the point of the continent where it strikes the 56th degree of N. latitude; from this last-mentioned point the line of demarcation shall follow the summit of the mountains parallel to the coast as far as the point of intersection of the 141st degree of W. longitude, and finally from the said point of intersection the said meridian line of the 141st degree in its prolongation as far as the frozen ocean. . . . Whenever the summit of the mountains which extend in a direction parallel to the coast . . . shall prove to be at the distance of more than 10 marine leagues (30 m.) from the coast, the limit between the British possessions . . . (and Alaska) shall be formed by a line parallel to the winding of the coast, which shall never exceed the distance of 10 marine leagues therefrom. On the W. the boundary is formed by the meridian line passing midway between the Diomede islets in Bering strait (recently determined by the U. S. Coast Survey to be nearly 168° 58′ W. Gr.) to its intersection with the parallel of 65° 30′ N. lat., thence S. W. in a course midway between St. Lawrence and Attu islands on the E. and Cape Chukotski and Copper island on the W., thus securing to the United States the Aleutian chain and all the islands in Bering sea N. of the Aleutians.—The name *Alaska* is a corruption of a word of native (Eskimo) origin, meaning the continent, and was first applied to the whole territory by Charles Sumner. The area of Alaska, subject to the inaccuracies of the maps, is estimated at 580,000 sq. m. Its extent from the S. E. boundary to the extreme western islet of the Aleutian chain is 57½° of lon., or an approximate distance on the parallel of 52° of 2,460 statute m. From the southern extreme of Amatignak island to the N. end of Point Barrow, on the Arctic coast, is a little more than 20° of lat., or nearly 1,400 statute m. The greatest distance which can be measured over the land in the territory on a meridian is from Point Barrow S. to the Pacific, about 1,000 m., and this is very nearly the longest line which can be drawn on the mainland of Alaska anywhere without cutting across some arm of the sea. The four extremes of the territory—Portland canal (E.), Amatignak island (S.), Attu island (W.), and Point Barrow (N.)—are respectively in lon. 130° W., lat. 51¼° N., lon. 187½° W., and lat. 71° 27′ N. The least distance between Alaska and the part of the United States nearest to it is 500 m. Taking the mouth of the Columbia river, Oregon, as a centre, from it Attu, the westernmost island of Alaska, and Eastport, Me., are about equidistant. From San Francisco, Cal., by sea, to the three chief ports of Alaska, the distances are about as follows: To Sitka, 1,500 m.; to Kadiak, 2,015 m.; and to Unalashka, 2,560 m.; by the inland passages the distance to Sitka is about 2,000 m. The amount of shore line of Alaska is very great. The Alexander archipelago alone has about twice as much as the E. coast of the United States, and the entire territory has about 18,500 m. of shore line, not counting minor irregularities, with which it would doubtless measure not less than 30,000 statute m.—The surface of Alaska is composed of mainland and islands. The latter, exclusive of scattering islands, some of which are important, may be assigned to two great archipelagoes. The Catharina archipelago contains the Aleutian islands properly so called, and those in the same trend S. from Aliaska peninsula as far E. as Cook's inlet. The Alexander archipelago comprises the islands from Dixon entrance N. and W. to Cape Spencer, the W. extreme of Cross sound. There are several large islands in Bering sea, of which the Pribiloff group, upon which the fur-seal fishery is situated, are alone of commercial importance.—The topography of Alaska is largely mountainous and broken. The extreme northwestern portion, especially the river valleys and the Arctic coast, is but little elevated above the sea, and is composed of nearly level alluvial formations. The southeastern border of the mainland, especially the St. Elias Alps and the mountains known as the Alaskan range, comprises the greatest uplifts known in North America. The Alexander archipelago, though broken and hilly, is much less elevated than the adjacent main. The same is true of the Catharina archipelago, if some volcanic cones be excepted. Certain islands, however, are low and nearly level. The mountains of the mainland form a continuation of those of British Columbia, and, like them, comprise a large number of short, broken ranges with narrow valleys between, but subject to great irregularities of height and direction. The general trend follows that of the seacoast, and the highest uplifts are at the head of that curve which bounds the Gulf of Alaska. The highest peak is that of St. Elias, which reaches about 19,000 ft.; about it are numerous others 4,000 or 5,000 ft. lower, of which the most remarkable are Mts. Fairweather and Crillon. These mountains appear to be similar in age to the Sierra Nevada, and are not volcanic, though among them are several small, low volcanic cones. Between the little-known Alaskan range and the sea are several very high volcanic peaks, the series of which is continued W. among the Aleutian islands. The most remarkable of these are Redoubt volcano (11,000 ft.), Iliamna peak (12,000 ft.), and Pavloff volcano (9,000 ft.), on the peninsula, and on different islands Shishaldin, Pogrumnaia, Akutan, Makushin, Vsevidoff, Korovin, Goreloi, and Semisopochnoi peaks, varying from 3,000 to 8,500 ft. in height. The snow line in midsummer descends to about 5,000 ft. above the sea, and among those mountains which rise above it, especially in the vicinity of Mt. St. Elias, large numbers of glaciers are found, some of which are unequalled in size and extent except in Greenland and the Antarctic region. The less elevated portion of Alaska, N. of the Yukon, is almost free from glaciers, but presents the phenomenon of strata of solid ice beneath the surface of the earth, of which the most remarkable outcrop is in Kotzebue sound. As the highest elevations of Alaska are on its southern border, so its most important water-shed is on their northern slopes. The chief river of Alaska is the Yukon, which rises in British Columbia, near the headwaters of the Stikine, the Taku, and the Liard rivers, and enters the territory in about lat. 65° 30′. After numerous windings, it falls into Bering sea, S. of Norton sound, through an enormous delta, more than 50 m. in width. The length of the Yukon from its headwaters to the sea is between 1,600 and 2,000 m.; the latter figure probably not far from the truth, if all the windings are taken into account. The river is navigable by steamers for about 1,300 m., or from the sea to a considerable distance beyond the American boundary. Three small steamers are running (1882) upon it in the service of traders and prospectors. The principal upper branches of the Yukon are the Pelly, the Tahko, and the Lewis rivers. The most important tributaries are the Porcupine from the N. and the Tananah from the S. North of the Yukon 4 or 5 large unexplored rivers fall into the Arctic sea. S. of the Yukon the Kusko-kwim and Nushagak rivers drain a large area into Bering sea. The Copper or Atnah river is the most important of those falling into the Pacific. The Chilkat, Chilkoot, Taku, and Stikine, flowing into the inland waters of the Alexander archipelago, are small, but have become widely known from the discovery of or search for gold along their courses. The Stikine has served as a highway to the N. W. regions of British Columbia, from which much gold has been obtained, and steamers have been running on this river for more than ten years. The rivers and inlets from the sea are the roads of Alaska, by which all summer travel and transportation passes. There are probably not five miles of ordinary road in the territory.—The climate of Alaska differs greatly in different parts of it; consequently the territory may be divided, so far as its weather and vegetation are concerned, into three tolerably well-marked districts. The Alexander archipelago has a climate of its own, marked by a large rainfall, cool and cloudy summers, and mild but stormy winters. It has been called the Sitkan district for convenience of reference. The mean of forty-seven years' observations at Sitka shows an annual mean temperature of 42·28° F., with extremes for single years of 41·5° and 46·8°. The highest temperature ever recorded is 87·8°; the lowest, 7° below zero; while in the entire period it is recorded as below zero on but five occasions. From Beardslee's hourly observations in 1879–'80, it appears that 47·2 per cent. of the weather was fair, or showed "blue sky and clouds," while 42·2 per cent. was snowy, misty, or rainy. The mean rainfall for the same period was a little over 56 inches, but for 32 years' observations the mean annual rainfall is about 81 inches. The climate of this part of Alaska is extremely similar to that of southwestern Norway. The coast is never obstructed by ice. The vegetable productions of the Sitkan region are similar to those of British Columbia. Excepting small trees, willow, birch, and poplar, the native trees are all coniferous; one, the Alaska cedar, is peculiar to this district, and most of them are valuable for timber, tan bark, or ship-building. The region is densely wooded for the most part, and the trees frequently grow to a great size. The shrubbery is very dense and luxuriant, and grasses of all varieties make excellent growth and attain unusual height. Potatoes (3 to 30 oz. each), cabbages, cauliflowers (10 to 15 lbs. each), turnips, cress, and radishes have done well at Sitka for several years in succession; celery, green peas, and string beans have done well, but do not seem to be a sure crop; cereals have not been tested here, but the season is probably too cool and wet for them to succeed except on rare occasions. The greater part of the Catharina archipelago forms a second climatic district, which has been called the

Aleutian district. It differs from the Sitkan district in having less rainfall, slightly cooler winters, and warmer summers, though about the same mean temperature; the extreme western portions are more foggy than the eastern parts, especially the island of Kadiak, which is decidedly more sunny than any part of the Sitkan district. In native vegetation this region is marked by the absence of trees west of Kadiak, except alders and willows, which reach only a small height, and in the western part rise but a foot or two above the ground. Herbage is luxuriant; there are many beautiful flowering plants, including some peculiar species. Introduced spruce trees have made a slow but healthy growth at Unalashka. Only spruce has been tried. Garden vegetables have not been as thoroughly tested as at Sitka, but potatoes, turnips, radishes, and lettuce have long been grown, and with better care would doubtless equal those of Sitka in quality. Cattle do well with ordinary care, and can graze during a large part of the winter. The harbors are rarely obstructed by ice. The Yukon district, which comprises all that part ot Alaska drained by the waters of the Yukon, Kuskokwim, Nushagak, and their tributaries, has an almost Arctic climate, slightly modified on the seacoast. The winters are long, and often extremely cold, with an abundant snowfall; the summers are short, very hot when the weather is clear, with little rain, and, except on the coast, but little fog. The lower Yukon valley is warmer than the normal, for some unexplained reason. The severity of the climate is partly atoned for by the rather abundant forests of spruce, birch, larch, poplar, and willow, which attain a fairly good size, but are wanting on the immediate sea-coast, though extending N. of the Arctic circle in the interior. The summer temperature of the lower Yukon valley is about 50°; farther N. it is warmer still, and clear days are usually very hot; the highest recorded temperature is 86°. In winter the thermometer may fall to 65° below zero. There is practically no spring or autumn; the rivers freeze over about Oct. 20th, and break up in a freshet about the end of May. A few hardy vegetables have been raised in gardens, but only by the exercise of great care. The sea is frozen during the winter and early spring. The moderate temperatures of the southern part of Alaska are due to the ameliorating influences of the Kuro-siwo or north Pacific current, which affects the northwest coast of America much as the Gulf stream water does the coasts of Europe. The reason why the Yukon district is so much less genial than districts of corresponding latitude in Europe is because the warm water does not, as was formerly supposed, enter Bering sea to any extent, but is broken up and dissipated by the barrier of the Aleutian chain, leaving Bering sea to be chiefly filled by a drift of cold Arctic water. A northerly current has been observed through Bering strait, under certain circumstances, in summer, but it appears to be a strictly local phenomenon; while the observations of the Jeannette expedition show conclusively that the motions of the ice in the sea N. of the strait are closely dependent upon the winds, and vary with them.—The native population of the territory is composed of four distinct stocks, two of which may be subdivided. These stocks or races are the Innŭit or Eskimo; the Tinneh Indians or Athabaskans; the Thlinkit or Koloshians; and the Haida. The Innŭit comprise the Eskimo proper and the Aleutian islanders, who call themselves Ŭnŭng'ŭn. The Tinneh in Alaska may be divided into the Tinneh and Kŭt'chin groups. All these different groups are more or less distinctly divided into tribes or clans, occupying certain territory. The boundaries of the tribal territories, once pretty well defined, are, since intertribal wars were checked by the advent of the whites, growing less marked, and especially among the Innŭit the tribal lines themselves are becoming more difficult to define. Also, as these people actually occupy but an insignificant part of the territory of Alaska, and move from one place to another for trade, fisheries, or hunting, any attempt at political geography based on tribal differences must be purely provisional, and to some extent arbitrary. In a general way the Haida (less than 1,000 souls) inhabit points in the southern part of the Alexander archipelago. The remainder of the archipelago and the mainland coast of the territory, as far W. as the mouth of the Copper river, is inhabited by people of the Thlinkit nation. W. of this the coasts, both western and Arctic, almost without exception, are inhabited by Innuit, who extend their range inland for some distance on the large rivers and occupy the whole of the peninsula between Kotzebue and Norton sounds. The Innuit are divided by language only from their relatives, the Unungun or Aleuts, their original habits being essentially the same. But the Aleuts have been subjugated, Christianized, and half civilized by the Russians, while only a small part of the Innuit have been similarly subdued. The inhabited parts of the vast and little known interior are peopled by Indians of the Tinneh stock, part of whom have permanent villages, which are their winter headquarters, while those of the Kutchin division live in temporary lodges which they move from place to place. The total number of the native population has been much exaggerated. The following figures, from the census of 1880, though necessarily not exact, are probably far nearer the truth than any of the larger estimates:

Innuit..	Unungun	2,145
	Innuit	17.617
Tinneh.	Kutchin	1,112
	Tinneh	2,815
Thlinkit		6,763
Haida		788
Total native population		31,240

Even in the above table it is probable that the estimates of the unknown number of Tinneh on the upper Yukon and Tananah rivers, and of the Innuit of the Arctic coast not actually counted, will prove to be somewhat in excess of the actual number. The white American population in the western and northern parts of the territory, engaged in the fur-trade, may be supposed to be pretty uniform, and is given as 145 in the census report; that of southeastern Alaska, on the contrary, largely dependent on mining, is subject to considerable fluctuation, and, according to the testimony given before the congressional committee (winter 1881–'82), has considerably increased since the census year. It was 293 in 1880, but is now estimated at 1,200. The treaty-citizens or subjects of Russia not belonging to savage tribes (but who usually have some native blood in their veins, and are called Creoles in the territory) are enumerated as 1,756 by the census, and probably have diminished rather than increased. The total population may therefore be taken at about 33.000, of whom about 2,900 are or may be qualified for citizenship, and about as many more (Aleuts and Innuit) are more or less civilized.—The chief ports and business centres of Alaska are, in the order of their present importance, Juneau City, on Gastineau channel, in the northern part of the Alexander archipelago, a mining town in about the same latitude as Christiansand, Norway; Sitka, on Baranoff island, the old capital and present headquarters of the revenue officials, in about the latitude of Aberdeen; Unalashka or Iliuliuk, on the island of Unalashka, in nearly the latitude of Hull, England; St. Paul, Kadiak island, on about the parallel of Inverness, Scotland; and St. Michaels, the port of the Yukon territory, about as far N. as Trondhjem, Norway.—The political condition of Alaska is anomalous. Excepting the revenue laws, certain regulations for the fur-trade, and a few statutes originally enacted for Indian territory, no law is in force in the territory. There are no means of making or enforcing legal contracts, wills, or deeds; none for the protection of life and property or the punishment of crimes or misdemeanors (except against the revenue), for acquiring property in land belonging to the United States or in mineral deposits, or for the enlightenment or education of the inhabitants. This state of things has resulted from the neglect of the territory by congress and from the strong and continuous opposition to the development of the territory by immigration, exerted in their own interest by large corporations engaged in the fur-trade, which flourishes best where there is least competition. This has led to the publication of various reports and descriptions of Alaska which have differed widely in standpoint and are very puzzling to the reader in search of information. From the point of view of the fur interest, the territory, except for its furs, is worthless, and the best plan is to let it and them entirely alone; from the point of view of the explorer, miner, and immigrant wishing to develop the supposed resources of the country, the protection of the law is his by right, and with it granted he has confidence in the wealth and prospective development of a large part of the territory. The contradictions of the official literature relating to Alaska cannot be understood by the general reader without some such explanation.—At present the fur-trade is the preponderating interest in the territory, both in the value of its product and in the revenue derived from it by the government. The fur-seal fishery on the Pribiloff islands is the object of a special monopoly, being leased for twenty years from May 1, 1870, by act of congress. The Alaska Commercial company holds the lease and pays to the government, in the shape of tax, rental, etc., nearly $300,000 per annum; 100,000 male seals may be taken per annum for their skins. The latter are salted green, packed in bundles, and taken to London for sale. The killing, skinning, and handling is done by Aleuts, and has been described in great detail by H. W. Elliott. Other fur-trading in the territory is free, except that the natives, or white men married to natives, alone are permitted to kill fur animals. The above-mentioned and several other companies have trading stations, at which furs are bought from the natives, at numerous points all over the territory. No satisfactory statistics of the present product (except of the fur seal-skins) are available, as the companies keep their business much to themselves, and published figures, even of the census, are known to be inadequate. The chief fur after the fur-seal in value is the sea-otter, of which it is said about 5,000 were killed in the season of 1879–'80. The others are mink, marten, river-otter, beaver; red, white, blue, and silver foxes; black and brown bear, lynx, musk-rat, marmot, and ermine. The amount of skins, or their value, produced in the territory, is at present unascertainable. The fur-traders very generally agree that the number of skins taken is considerably larger than in the later days of the Russian occupation, owing to the greater energy and higher prices of the American traders. A considerable number of hides—deer, reindeer, moose, sea-lion, and mountain-goat—are taken every year in the territory, but they are mostly used within its borders either for trade or domestic purposes.—The whale fishery, though much diminished from its former importance, flourishes in Alaskan waters, especially on the Arctic coast and in Bristol bay. Nearly all the fine whalebone used in the markets of the world comes from here, and most of the whale oil and best walrus ivory. The products from the whaling fleet (omitting sperm oil and furs) imported into San Francisco in 1881 were 663,031 gals. oil, 330,599 lbs. whalebone, and 6,550 lbs. ivory, having a total value of $506,766. This was obtained by 24 vessels of 6,800 tons total tonnage, of which one was a steamer. The oil and refuse from the fur-seal fishery are for the most part wasted. The fisheries of Alaska are without doubt its greatest and most permanent source of wealth, though yet hardly touched upon, owing to the limited market of the Pacific coast and the absence of law for the protection of those who may engage in the business within the territory. The fishes at present made available are the cod, halibut, ulikon, herring, and salmon. The cod fishery is chiefly centred in the Shumagin islands. The other fisheries are in the Alexander archipelago, or at the mouths of the principal rivers. In 1880, according to the census report, 6,390 persons, mostly natives, were employed in fishing industries in Alaska, besides those belonging to the San Francisco cod-fishing fleet, who are enumerated under California but do their work in Alaska. In 1880, 1,156,000 lbs. of codfish were taken from the Shumagin fisheries, valued at about $50,000; in 1881, 1,544,000 lbs., valued at $66,400. It is probable that the product will be rapidly enlarged, as the fisheries of the Okhotsk sea (from which in 1881 two thirds of the cod imported into San Francisco were derived) have been practically closed to all but Russian fishermen, by an order of the Russian government which requires all fishing vessels to obtain a license at Vladivostok, 2,000 m. from the fishing-banks. The general fisheries of Alaska, according to the census, in 1880 produced 105,000,000 lbs. of fish, valued at $525,000, in addition to 120,000 gals. fish oil, valued at $12,000, and 2,654,000 lbs. of salmon, valued at $18,000. Since that time new oil-works and additional canneries have gone into operation.—The mineral resources of Alaska have been but little investigated. Valuable minerals, petroleum, coal, and precious metals, exist in the territory beyond question, but in what quantities and under what circumstances is for the most part yet to be determined. Gold and silver have been discovered in several places in the Alexander archipelago and on the adjacent mainland, especially near Sitka and Juneau City. Placers probably of small extent, but apparently quite rich, have been opened in the latter district, and in 1881, their first working season, the mail steamer is reported as having brought down over $150,000, and the express company in 1882 transported $240,000 in dust, besides what may have been taken away by private hands. Numerous auriferous quartz-ledges have been discovered, and one quartz-mill is reported in operation. Coal of inferior quality has been reported from many localities; further investigation is required to determine whether any of the deposits are of much value. Some of that in Cook's inlet was recently tried by an English steam yacht, and pronounced good. There are deposits of good coal on the Arctic coast, near Cape Lisburne, but they lie out of the track of ordinary commerce. Large deposits of magnetic iron ore of excellent quality are reported as existing on the Chilkat river. Extensive beds of white marble are found in several places in southeastern Alaska, one locality being quite near Sitka. Water-worn lumps of native copper have been often obtained from the Copper river, but their source has not yet been searched for. Specimens of sulphur, alum, cinnabar, etc., have been collected at various points, but of the commercial value of the deposits nothing is yet decided. In fact, before some systematic geological work has been done in Alaska, no proper estimate of its mineral wealth can be made.—Southeastern Alaska, as has already been mentioned, is well supplied with timber, which, in the future, will doubtless prove of value; but at present not a stick can be cut, except in violation of law, even for the explorer's camp-fire. Two small saw-mills meet a part of the local demand, and are so evidently a necessity that they have remained unmolested. The timber grows to a large size (sometimes 8 ft. in diameter and 100 ft. high), and, owing to the numerous channels and steep hillsides, is easily got at and transported to the water's edge. No large demand, except for local uses, is likely to be made upon Alaskan forests until sources of supply nearer commercial centres show signs of depletion; though it may be that the resistance offered by the aromatic Alaska cedar (*Chamæcyparis nutkatensis*, Spach) to the teredo may bring it into demand at an earlier time.—The history of Alaska is the history of the fur-trade of northwest America. The first white man whose eyes looked upon any part of the present territory was probably the Cossack Simeon Deshneff, who passed through Bering strait in the autumn of 1648, but whose voyage remained for many years unknown to geographers. In 1728 Bering, on his first voyage, saw and named St. Lawrence island. In 1731 Michael Gwosdeff, a Russian surveyor, passed through Bering strait, and he is the first one recorded as having seen the mainland on the American side beyond the Diomedes. In 1741 Bering's party, in two ships, of which one was commanded by Chirikoff, sailed from Kamtchatka to explore the American coast. The vessels became separated, and on the 15th of July Chirikoff made the land in the vicinity of Chichagoff island, or Cross sound. He sent one and then another boat to the land, but they never returned, and were doubtless murdered by the savages. Having no more boats, the Russians were obliged to depart in ignorance of the fate of their shipmates. On the 18th of July, Bering saw land, and on the 20th anchored N. W. from Kayak island, in lat. 60°. Steller, the naturalist and surgeon, went ashore and found traces of the natives. The next day Bering put to sea again and sailed in a confused manner among the Aleutian islands, and finally reached Bering island, where he died. Here his unfortunate crew wintered, and returned to Kamtchatka the following summer in a boat constructed from the remains of their vessel. The furs brought back by the sailors of this expedition attracted the attention of the fur-traders and hunters who had conquered eastern Siberia for Russia. Numerous parties were then fitted out, and between 1748 and 1772 most of the Aleutian islands and part of the peninsula had become known to the Russians, both by the visits of hunters (promishléniks) and some expeditions sent out by the government. The progress of the fur-traders, in wretched boats, without navigating instruments and with little provision, was marked by undaunted energy and the grossest ill-treatment of the natives, the memory of which still lingers among the Aleuts. In 1774 the Spaniards began those explorations by which in 1775 they reached the bay of Sitka. In 1776, however, an epoch in discovery was opened by the sailing of Captains James Cook and Charles Clerke on a voyage of discovery in the North Pacific. In 1778 they traced the general lines of the coast from Nootka to Icy cape. After this, the riches of the fur-trade on these shores becoming generally known, the coast was visited by Russian, British, French, Spanish, and American vessels, each of which did more or less exploring, in some cases established trading-posts, and laid the foundations of those international difficulties and conflicting claims which received a partial settlement in the British-Russian treaty of 1825. In 1791 Capt. George Vancouver was sent from England to explore the Straits of Fuca, survey the northwest coast to the 60th parallel, and determine with the Spanish commissioner on an indemnity for British subjects who had suffered in the difficulties above mentioned. In 1792–'94 Vancouver completed the most remarkable survey ever made under similar circumstances, on which all present charts of the region are chiefly based, after which he returned to England. Various Russian trading companies had obtained a footing in Alaska, and their controversies with each other and cruelty to the natives became a public scandal. In 1799 imperial intervention was obtained, and a twenty-years' charter was issued to a new company under the name of the Russian-American company, giving them the exclusive control of the N. W. coast N. of lat. 55°. The Aleuts were to be serfs of the company, other natives to pay tribute. The chief director at Sitka controlled the government of the territory, subject in but few cases to an appeal to the board of directors at Irkutsk. The company was to settle, cultivate, trade, explore, propagate the Greek Catholic religion, and extend the Russian territory and influence as far as could be done without trespassing on the rights of other nations. In October, 1821, the charter was extended for twenty years, and again in 1844, terminating finally in January, 1862. Meanwhile, explorations, disputes about boundary-lines, trade, and settlement had been in progress; but abuses which seemed to be beyond remedy grew up in the company's government, and, notwithstanding the fact that many of its governors were men of intelligence and honor, its business affairs were corruptly administered, and the receipts were wrongfully diverted from the shareholders. The obligations of the company toward its native wards were neglected, and an examination by an imperial commissioner being made, on his report a reissue of the charter was refused. In 1864 a project for building a telegraph line through the N. W. part of America and via Bering strait and Siberia, to join the Russian lines at the mouth of the Amur, was projected by Collins and others. Active operations began in 1865, with the coöperation of the Russian and American governments. Though the object of the expedition was not attained, a large amount of information about the territory was obtained by explorers in its service, and their testimony was largely instrumental in determining its fate when the question of cession was entertained by the American congress. In 1867 the treaty of sale was agreed upon, ratified May 28th, exchanged and proclaimed June 20th, and the territory formally surrendered to the representative of the United States by the colonial authorities Oct. 18, 1867.—See Whymper's "Travels in Alaska" (London, 1869); Dall's "Alaska and its Resources" (Boston, 1870); Golovin's "Review of the Russian Colonies in America" (St. Petersburg, 1862); Vahl's "Alaska" (Copenhagen, 1872); Sheldon Jackson's "Alaska and Missions" (New York, 1880); "Coast Pilot of Alaska," App. I. (U. S. Coast Survey, 1879); Powell's "Contributions to American Ethnology," vol. i. (Washington, 1877); H. W. Elliott's "U. S. Census," Special Bulletin 176 (Washington, 1882).

ALEUTIAN ISLANDS, a chain of islands extending from the end of the peninsula of Aliaska westward to lon. 188° W. Gr., and belonging to the territory of Alaska. They form part of the Catharina archipelago, and are divided into the following groups: The Nearer (Blizhni) islands are those nearest to Kamtchatka, and include among others Attu, the westernmost land belonging to the United States; Agattu, and the Semichi islets. The Rat (Kreesi) islands are those between 180° and 185° W. Gr., including Bouldyr, Kyska, Sitkin, Rat, Amchitka, and Semisopochnoi or Seven-volcano island. The Andreanoffski islands (named for their discoverer), some thirty in number, extend from 180° to 172° W., of which the more important are Atka, Adakh, Tanaga, Kanaga, Amlia, Seguam, Sitkin, Gareloi, and Amatignak, the southernmost land of the whole chain and of Alaska. The Fox islands, lon. 172° to 163° 20′ W. Gr., the largest and most eastern group of the Aleutians, contain among others Unimak, Unalashka, Umnak, Akutan, Akhun, Yunaska, Amukhta, and the volcano islands of Bogosloff and the Four Craters. There are still smaller groups included in those above mentioned. The term Aleut (pronounced al′-ey-oot) is derived from a native word, *il′-ū-ă* or *ee′-lŭ-ăt*, applied by the Kariaks or Chukchi to islands, and used by them, in speaking of the Diomede islands, to the early Russian explorers, who gradually came to use the term, somewhat corrupted, as a name for any of the islands east from Kamtchatka and for their inhabitants. The charts of these islands are still quite imperfect. From the best attainable data, the area of the group is about 6,400 sq. m. The length of the chain is about 1,100 m., and the islands range in latitude between the parallels of 51° 10′ and 55° N. The Pribiloff or Fur-seal islands and the Commander islands do not belong to the Aleutian group, as frequently stated. The islands are formed of rocks varying from jurassic or triassic to post-tertiary lavas. They are not all, as frequently assumed, wholly volcanic; some of the western ones have no volcanic rocks in their entire make-up. But others are wholly or partly eruptive, and the group contains some of the most beautiful and remarkable American volcanoes, such as Shishaldin (8,955 ft.), Akutan (3,350 ft.), Makushin (5,691 ft.), Bogosloff (844 ft.), Vsevidoff, Gareloi, and Semisopochnoi. The volcanic activity of these and other peaks is evidently diminishing. Akutan, one of the youngest, is the only one which exhibits much activity, and there has been no eruption of consequence in the Aleutian group for half a century. Hot springs and light earthquakes are not uncommon. The island of Bogosloff (*Joanna Bogoslova*, or St. John the Theologian) is said to have risen from the sea on St. John's day, 1796, and to have suffered various changes since. It is certain that there has been a rock in this locality ever since the islands have been known to civilized men. The islands generally are hilly or mountainous, but there are several marked exceptions, such as Amchitka. There are no trees native to the group, but small shrubs and herbage grow with great luxuriance. Potatoes, turnips, radishes, and other hardy vegetables are grown, and cattle and sheep have done well, even when unprovided with hay or shelter in winter. The climate is mild, foggy, and rather moist in summer, and subject to severe storms in winter, though never very cold. The land animals are only marmots, foxes, and field mice, which are wanting altogether in some of the more western islands. It is believed that the foxes were originally introduced by man, in most of the islands. Seals, sea-lions, and sea-otters are found in the waters adjacent, and the trade in sea-otters is the principal source of revenue for the inhabitants, who live chiefly upon fish and birds, the flesh of whales and animals killed in hunting, and are dependent upon the traders for flour, tea, sugar, and most articles of clothing. Hunting parties visit nearly all the islands from time to time, but the permanent settlements are few. They are, in the order of their importance, Iliuliuk (together with four outlying but not very distant villages), on Unalashka; a village on the island of Atka; one on Attu; Akhun; Avatanak; Umnak; Unimak; and one on Biorka island. Settlements on Amlia island, on Korovinsky bay, Atka, and Tigalda island are said to have recently been abandoned. The census of 1880 gives as the population of the Aleutian group 1,108 Aleuts, 256 half-breeds or creoles, and 28 Americans, a total of 1,892. The Aleuts are a people of Eskimo extraction originally, differing from the adjacent continental Eskimo chiefly in dialect, but now all more or less civilized, and all members of the Greek church. There are probably none of absolutely pure blood, but the mixture is chiefly Russian. They have no kinship whatever to the Japanese or Chinese. They are of short stature, rather light-brown complexion, and dark-haired; originally of warlike and lively disposition, they have been reduced by serfdom to timidity and taciturnity, though still retaining their good nature and hospitality. They were formerly very numerous, but are now reduced to about 2,500 in all, of whom part live on the Pribiloff islands and the continent. The islands possess many excellent harbors, of which Iliuliuk and Chernoffsky, on Unalashka; Kyska harbor, Kyska island, and Chichagoff harbor, Attu, are the most important. The harbor at Nazan bay, Atka, is not very good, and some of the islands have no harbors. The passes between the islands are subject, with the flood tide and northerly winds, or the reverse, to heavy tide rips, which are the terror of inexperienced navigators. Those most used are the passes of Unimak, Amŭkhta (or "172° Pass"), and Akutan, though, with proper precaution, nearly all are available.—The Aleutian islands were discovered by the expedition of Bering and Chirikoff, on the return voyage in 1741. They were subsequently investigated by a horde of traders, hunters, and adventurers, as well as by a few government expeditions from Russia. The most detailed account of them is that published in Russian by the missionary Veniaminoff, which is partly reproduced by Dall in his "Alaska and its Resources" (Boston, 1870). A comprehensive survey was begun by the Russian-American company, and charts were published by Tebienkoff in 1850. These have since been much improved upon by those of the United States North Pacific Exploring Expedition under Lieut. (the late admiral) John Rodgers, U. S. N., in 1854, and those of the Coast Survey, of more recent date.

ALEXANDER III., Alexandrovitch, emperor of Russia, born March 10, 1845. He is the second son of Alexander II., and became the heir apparent to the throne on the death of his elder brother in 1865. The next year he married the princess Dagmar, of Denmark. He early manifested his sympathy with the old Russian party, hostile to foreigners; and he held an important command in the war of 1877-'8. He became emperor on the death of his father, who was assassinated in the streets of St. Petersburg, March 13, 1881. The Nihilists, who had accomplished that deed after several determined but unsuccessful attempts, issued two proclamations. One, addressed to the people of Europe, declared that "Everywhere, in all countries, individuals are overtaken by ruin, but nowhere from such slight causes as in Russia; everywhere the interests of the people are sacrificed to the interests of the ruling classes, but nowhere are the people trampled down with greater arrogance and greater cynicism than here. Hunted and baited, by the conditions imposed upon them placed in a position where it was impossible to carry out their ideas, the revolutionary party were gradually drawn into an open conflict with the government, whereby they confined themselves to defending themselves with weapons in their hands against the agents of the government. The response of the government to that was the death-sentence.. Life was impossible: there only remained a choice between moral and physical destruction. Scorning the pitiful existence of slaves, the Russian social-revolutionary party determined either to perish or to crush the despotism, centuries old, which stifled the life of the Russian people. Conscious of the magnitude of its task, conscious of the harm caused by Russian absolutism—harm not only to Russia, but to the whole world, menaced by this system which suppresses justice, liberty, and civilization—the party began to organize the struggle against the system of despotism. The catastrophe which fell upon Alexander II. is only a single episode in the conflict. The executive committee does not doubt that the thinking, honest people of western Europe will understand the importance of this struggle, and will not prejudge the manner in which it is conducted, since this manner is necessitated by the inhumanity of the Russian authorities, and since for the Russian there is no other way but sanguinary conflict." The other, addressed to the new emperor, informed him that the work of terrorism would only be abandoned when all political offenders were amnestied, and when he should convoke a national assembly, to be elected by the votes of all classes, for revising and reforming the private laws of the realm. The government took extraordinary precautions for the protection of his life, which have since been constantly maintained. He took up his residence in the castle of Gatchina, where he has been so surrounded by guards and so difficult of access, even to high officers of the government, as to be himself practically a close prisoner. Numerous arrests were made, the secret police was reorganized, cities were placed under martial law, the practice of banishment to Siberia without trial was resumed; everything was done to protect him from assassination, except compliance with any of the demands of the Nihilists. The appointment of a day for his coronation at Moscow was deferred repeatedly, and finally was fixed for May 27, 1883, when it took place. His proclamation gave no hope of any reform. He has four children: Nicholas, heir apparent, born in 1868; George, Xenia, and Michael.

ALEXANDER ARCHIPELAGO, the islands extending along the coast of N. W. America from Dixon entrance, in lat. 54° 40′ N. to lat. 59° N. The group was named by the United States Coast Survey, in 1869. See Alaska.

ALFONSO XII., king of Spain, born Nov. 28, 1857. The only son of Isabella II. and the titular king Francisco de Asis, he followed his parents into exile in 1868, and was educated at Vienna, Paris, and Sandhurst. His mother resigned her rights in his favor, June 25, 1870, and civil wars soon paved the way for the restoration of the Bourbon dynasty. In the last days of 1874 he was proclaimed king by the armies of the centre and north, fighting the Carlists, and in Madrid; and on Jan. 14, 1875, he entered his capital. The Carlist war was ended in 1876. In January, 1878, Alfonso married his cousin Maria de las Mercedes, a daughter of the duke de Montpensier, but five months later she died. In November, 1879, he married the archduchess Maria Christina of Austria, who bore him a princess, Sept. 11, 1880. Two futile attempts on his life were made in October, 1878, and December, 1879. He has two daughters.

ANDERSON, Mary, an American actress, born in Sacramento, Cal., July 28, 1859. Her parents removed to Louisville, Ky., while she was an infant, and three years later her father died. She was educated at the Ursuline convent in Louisville, and at the age of thirteen determined to go upon the stage. For this purpose she was placed under special training in English literature, music, and dancing; but in elocution she was self-taught. On the advice of Charlotte Cushman, whom she met in Cincinnati in 1874, she went to New York for a course of dramatic lessons, returned home and studied a year longer, and then made her début as Juliet, at Macauley's theatre, Louisville, Nov. 27, 1875. In February, 1876, she played for a week at the same theatre, as Bianca in "Fazio," Evadne, Julia in "The Hunchback," and Juliet, her success being such as to bring her numerous offers of professional engagements. Subsequently she played in St. Louis and New Orleans. At the latter place she made a marked sensation and received numerous gifts, including a costly piece of jewelry presented by a military company. She has since appeared in the principal cities of the United States, playing, besides the characters already mentioned, Lady Macbeth, Meg Merrilies, Parthenia in "Ingomar," Pauline in "The Lady of Lyons," the Countess in "Love," Ion, the Duchess in "Faint Heart never won Fair Lady," Galatea, and Berte in "The Daughter of Roland."

ARABI AHMED PASHA, an Egyptian soldier, born in the province of Charkieh, lower Egypt, about 1845. His family were of the fellahs, or laboring class, and he was drawn as a conscript for the army under Said Pasha. When that commander was removing foreign officers and replacing them with natives, Arabi received rapid promotion. After a time he was retired temporarily, and spent the interim in studying the sciences at the university of Cairo. He formed an intimate acquaintance with Ali Pasha, and about 1877 they organized a secret society among the native army officers, the principal object of which was to overthrow the government. The khedive combined with them, they received pecuniary aid from certain European bankers, and in 1879 the European ministry fell. Arabi was now given the command of a regiment, and soon after became minister of war and marine. His secret society had grown into a political party hostile to all foreigners, whose motto was "Egypt for the Egyptians." This sentiment was carried to the extreme, and repudiation of the debt, made by Ismail Pasha, and due chiefly to European creditors, was also demanded. Arabi was made a general, with the title of pasha, projected an arsenal at Suez, and planned seacoast fortifications to prevent the landing of European troops. Circassian officers and others were arrested arbitrarily and banished, at which the sultan was offended, and the conflict of authorities soon produced a complicated state of affairs. A riot broke out in Alexandria in June, 1882, in which the Arab population was roused to fury against the European, and 70 of the latter and over 600 of the former were slain. The khedive assigned the task of preserving order in the city to Arabi, whereupon the European population fled in consternation. While British ironclads were in the harbor, and negotiations for the protection of foreigners were going on, Arabi was increasing and drilling his forces. The forts were bombarded by the fleet on the 11th of July, and made a gallant resistance. When they were no longer tenable, Arabi evacuated the town and retired inland, throwing up intrenchments at Kafr-Dowar, and strengthening the fortifications of Aboukir. His force constantly increased, till he had about 70,000 men and 150 guns, and he organized a military government which assumed to cover the whole country. In the course of a month a British expedition, which numbered about 25,000 men, commanded by Sir Garnet Wolseley, was sent against him. Arabi massed his forces at Tel-el-Kebir, near Zagazig, which is the key of the delta railway system, and on the 28th of August made a spirited attack on a division of the British right, under General Graham, at Kassassin. The attack was repelled, and the retreat of the Egyptians was soon turned into a complete rout. On the 9th of September he made a more determined assault, but was again repelled. Four days later, the British army, having been placed before Tel-el-Kebir in the night, carried the fortifications of that place by storm, shattered Arabi's army, mercilessly slaughtered the wounded and many of the fugitives, and took possession of Zagazig. A detachment entered Cairo on the 15th, where Arabi and several of his officers were captured. They were tried by a military tribunal, and Arabi pleaded guilty to the charge of rebellion. According to a previous understanding, the death sentence was commuted by the khedive to perpetual banishment, and Ceylon was designated as the place of exile, whither Arabi, Mahmoud Sahmi, and Toulba were conveyed.

ARCHÆOLOGY. Discoveries of antiques illustrating the civilizations of Egypt, ancient Chaldea, and Greece, have recently been exhumed and deposited in the British Museum, the Boulak Museum of the khedive, and the Royal Museum at Berlin. In Egypt an extraordinary treasure of sepulchral relics was brought to light in the summer of 1881, through the efforts of Prof. Maspero. For many years curious antiquities had occasionally appeared in the markets, of a sort which led to the suspicion that the Arab traders had discovered a royal tomb, which they were secretly rifling. On deciphering a photographic copy of a ritual purchased by a traveller at Thebes, and discovering it to be the funeral papyrus of Pinotem I., Prof. Maspero's suspicions were confirmed. Having been appointed conservator of the khedival collections, he went to Thebes and arrested an Arab dealer in relics, one of three brothers who alone were in possession of the secret. This man, after many weeks of obstinate reticence, disclosed the situation of the treasure, and the objects were then taken out by Emil Brugsch and transported to Cairo. The place was a cave which had been used as a hiding-place, to which the contents of royal sepulchres had been taken for safety. The removal took place, it is supposed, either at the time of the tomb robberies of the twentieth dynasty, or of the sacking of Thebes by the Assyrians. The mummies and grave-treasures were piled together in great confusion, and there were evidences that the place had already been ransacked. About 6,000 objects were taken out, including 29 mummies of kings, queens, princes, and high-priests, 5 papyri, 1 of which is the funeral papyrus of Queen Makera, of the twentieth dynasty, and 2 plaques of the kind which Prof. Maspero has before described from specimens which must have come from the same place. The mummy-cases, which were all contained in a chamber 23 ft. by 13, had been opened by Arabs, and into some the wrong mummy had been returned, as the names on the bandages did not correspond to those upon the cases. The mummies of people of the eighteenth and nineteenth dynasties appear to have been removed to this place of safety from their graves in the Valley of the Tombs during the reign of the first priest-king, Her-Hor. Many statuettes, inscribed tablets, scarabæi, mummies, etc., have been sold to travellers of late years, which were undoubtedly taken from this place by the Arabs, who have probably known the secret of the chamber for more than 20 years. The hiding-place was behind an angle of a cliff a little way from Deir-el-Bahari, near Thebes, S. W. of the village. The entrance to the chamber was by a perpendicular shaft, 12 metres deep, whose mouth was 60 metres above the plain. From the bottom of the pit a gallery, 74 metres in length, conducted to the chamber, whose dimensions were 7 metres by 4.—Early in 1882 the pyramids of Merenra and Pepi, of the 6th dynasty, Uners of the 5th, and Senefroo, of the 3d, were entered under Maspero's direction. The inscriptions and relics are chiefly of interest on account of their extreme antiquity. The pyramid of Senefroo, commonly called Meydoun, is the most ancient Egyptian monument, assignable to any definite epoch, that has been examined. In February and March, 1883, M. Naville explored the ruins at Tel-el-Mashkuta, near Ramsis, on the railroad from Cairo to Ismaileh, and identified that place with the treasure-city Pithom, which the Hebrews built for Pharaoh, as well as with the Succoth, whence they started when they went out of Egypt, and with the city known to the Greeks as Heroöpolis. He is also believed to have established that Ramses II. was the Pharaoh who oppressed the Hebrews. Among the inscriptions was one referring to a place called Pi-keheret, as being in the same nome. This is believed to be the Egyptian form of the Biblical name Pi-hahiroth, the place where the Israelites were encamped previous to crossing the Red sea. A large portion of the monuments and inscriptions recovered refer to the later dynasties.—Assyriologists have for some time expected that in the ruined cities of Babylonia more ancient versions of the Assyrian text than the cuneiform inscriptions already recovered would yet be brought to light. In 1880 Hormuzd Rassam found a fragment of a tablet relating to the Deluge in the ruins of one of the temple libraries of Babylon. Through the seasons of 1880 and 1881 the same explorer industriously examined the sites of the Chaldean cities of Babylon, Borsippa, Sippara, and Cutha, and unearthed a large number of religious texts and records. Since the large discovery of inscribed tablets made by Arabs in 1874, innumerable relics and inscriptions have been exhumed in Babylon. The same spot has been explored by Rassam. It was the centre of commercial life in ancient Babylon, being the court of a family named Beni Egibi, who seem to have been financial agents of the government. The tax-receipts found here reveal the fact that the taxes for the maintenance of the irrigation canals and the highways were raised by duties on the land, the date and corn crops, and on cattle. From the palaces of Babylon, Rassam has recovered records which cover the period from the reign of Nabonidus to the capture of the city by Cyrus. Babylon was built almost entirely of brick. Chambers and corridors of the Palace of the Kings, with decorations of plaster and painted bricks, were found. Extensive hydraulic works, consisting of wells and conduits connected with the river, seem to indicate the locality of the hanging gardens. One of the kings, according to a discovered document, had sixty gardens or paradises made for him near the city. Rassam has identified and explored the sites of two cities of higher antiquity than Babylon. These are Sippara, the city of the Sun-god, which, according to Berosus, was more ancient than Ur, having been founded before the flood, and Cutha, one of the great temple-cities of Babylonia. The modern name of the site of Sippara is Abbu Hubba. The mounds cover an area of over 2 m. in circumference. The buildings were placed with their angles to the cardinal points of the compass. The S. W. wall of an immense building was first uncovered. It was 1,500 ft. long, and broken at regular intervals by projecting buttresses, which were ornamented by grooved panels. The edifice consisted of many long, narrow rooms, with exceedingly thick walls, arranged around a central court. This building was the Temple of the Sun-god. In a large gallery were the remains of the sacrificial altar, nearly 30 ft. sq.; and in a connecting chamber were the records of the temple. One of the records is a votive tablet commemorating the victory of the Babylonian king Nabupallidina over the Sutu tribe of Elamites, and dating from about the year 852 B. C. It contains a figure in relief of the god and of the king and priests performing worship. It was the cult of the solar disk and rays, a form of which was introduced into Egypt in the eighteenth dynasty. This most ancient of the cities of Mesopotamia, and a neighboring place, whose ruins yielded records of minor importance, are in all probability identical with the cities of Sepharvaim mentioned in 2 Kings, xvii, 24–31, in connection with Cutha, whose site was also identified and partially explored by Rassam. The British Museum, which receives the objects recovered by Rassam, contains over 3,000 of these tablets of the earlier period, including the large collection secured from the Arabs by the late George Smith. The excavations at Olympia, which have been prosecuted since 1875 with means furnished by the German government, have revealed the whole plan of the city. The walled enclosure called the Sacred Grove, in which were the Temple of Zeus and the other shrines and sanctuaries, and the official buildings connected with the Olympic games, was about 4,000 ft. long, and extended back from the river to the foot of the mountain about 2,000 ft. The Temple of Zeus was a simpler, more massive and more imposing edifice than the Parthenon, built in a purer Doric style. The group of 21 colossal figures by Paionios, representing the battle between Oinomaos and Pelops, with Zeus as arbiter in the middle, which adorned the eastern pediment, have all been recovered in various states of preservation. Statues of the river-gods Alpheios and

Kladeos flanked the pediment. The western pediment contained a group by Alkmenes representing a contest at the wedding of Peirithoös arrested by the intervention of the young Apollo, showing drunken Centaurs carrying off the women and Hellenes coming to the rescue, with weeping female slaves on the ground. This composition consists likewise of 21 figures, of 13 of which the heads remain. At both ends of the temple are sculptures in high relief representing the labors of Herakles. They are pronounced by Curtius to belong to the same school of sculpture as the pediments. The pediments, which can be intelligibly reconstructed, surpass any pediments before known. Curtius assigns the sculptures of the temple to the school of Kalamis, which immediately preceded the highest development of Attic art in the age of Phidias. In the representation of Apollo the conventional traditions were adhered to, while in the forms of the men and Centaurs complete freedom was exercised. The Heraion, which comes next in size to the Temple of Zeus, dates from an earlier period. The ground-plan of another temple surrounded by pillars has also been discovered. It is the Metroön, or sanctuary of the mother of the gods. The treasuries have been exposed to view in the northern part of the Altis, or sacred enclosure. They resemble temples, and stand in a row. The two largest, the thesauri of the Syracusans and of the Megareans, have been identified. The latter contains sculptures representing the war of the giants, of an age preceding the Æginitæ. One of the most interesting monuments of the classic period is the colossal figure of Nike, by Paionios. The round temple built by Philip of Macedon after the battle of Chæronea stands in a fair state of preservation to the W. of the Heraion. Structures of the Roman period are rotundas, waterworks, etc., erected by Antoninus Pius and Herodes Atticus. An edifice consisting of a quadrangular court, approached by 2 colonnades, dates from about the same period as the Temple of Zeus. It is supposed to have been the meeting-place of the Olympic Council. A series of fine buildings stood between the Kladeos and the Altis on the W. A circular building contained an altar with inscriptions to "the hero," referring, undoubtedly, to Ianos, and afterward Klytias, founders of the priestly families of diviners which first gave to Olympia its importance. East of the Byzantine church was the court, surrounded with columns, which is called the grand gymnasium, probably the largest and most splendid building in Olympia. More than 400 inscriptions have been found. Many of them have reference to the visitors at the games, and afford much information regarding the different games. The German explorers have also exhumed important remains of the Acropolis at Pergamon, a city of great splendor in post-Alexandrian times. The sculptured ornaments of the great altar, mentioned by ancient writers, have been recovered in a good state of preservation. The principal frieze represents the battle of the gods and giants, and dates from about 200 B. C. The figures are of heroic size, and executed in a free and bold style. Some of them are fine types of manly strength and beauty; others fantastic mixtures of human and monstrous form. Athene is dragging a giant by the hair. Hecate is represented as having three heads and trunks and six arms. A lovely female figure, engaged in hurling at a giant a vase encircled with serpents, has puzzled all archæologists. Of the frieze, 94 slabs, about three fifths of the whole, have been excavated and sent to Berlin, and with them 34 slabs of the smaller frieze, representing scenes from the legend of Telephus; and numerous inscriptions, statues, and other relics.

ARCHERY, Modern. About the time that firearms began to come into common use, archery "tackle," as the bowman's implements are technically termed, ceased to be worn in warfare, but continued to be used for pastime. Queen Catharine of England in 1676 bestowed a magnificent medal upon the marshal of the fraternity of archers. In 1682 a grand gathering of bowmen was held on the grounds of the London artillery company, at which more than 1,000 archers were present, and the sight outshone everything since the Field of the Cloth of Gold, where Henry VIII. displayed his bowmanship to the French king and courtiers. From the date of this great meeting down to about 1844, little is known of the condition of archery. The exercise must have been almost wholly neglected, indeed; for at the first national meeting of the archers, which was held at York in 1844, the highest score was insignificant and the shooting generally very poor. But a grand national archery association was then formed, and the annual competition for the champion's medal established, and ever since the pastime has been eagerly practised. Wonderful progress marked the first ten years of this revival of archery in Great Britain. Several gentlemen, notably Mr. H. A. Ford, Mr. Bramhall, Mr. Moore, and that powerful Scotch archer, Mr. Muir, demonstrated the great accuracy which one may attain in shooting with the bow and arrows. In 1845 the ladies began to compete for the silver bracer and brooch offered by the association, and some remarkable scores were made within a few years. This silver bracer and the brooch constitute the ladies' prizes of championship, while the gentleman gaining most points is awarded an elegant medal; furthermore, cash prizes, aggregating several hundred pounds, are annually competed for at the targets. For gentlemen the order of shooting is what is styled the York round, consisting of 24 arrows at 60 yards, 48 arrows at 80 yards, and 72 arrows at 100 yards. This round is shot twice for the medal at each annual meeting, the aggregate being called a double York round. The points upon which the medal is awarded are reckoned as follows: Two for gross hits, two for gross score, one for best score at 100 yards, and one for best hits at 100 yards; the same at 80 and 60 yards, making in all 10 points. The ladies also shoot two days—on each day the national round, consisting of 48 arrows at 60 yards and 24 arrows at 50 yards. The bracer is awarded on eight points, reckoned as in the York round for gentlemen. The targets shot at by both ladies and gentlemen are circular disks of straw, 4 feet in diameter, faced with canvas, upon which are painted five concentric circles denominated, on account of their respective colors, gold, red, blue, black, white. The gold is the bull's-eye or centre, and is a little more than 9 inches in diameter. The order of the other rings, counting out from the centre, is as above; they are of equal width, and their respective values are: gold, 9; red, 7; blue, 5; black, 3; white, 1. The highest gross score ever made at a national meeting was 1,251 with the double York round by Horace A. Ford. The same archer once made a score of 188 with 24 arrows at 60 yards; on another occasion he hit the target 71 times out of 72 shots, missing with his 59th arrow only, at 100 yards. He is, beyond doubt, the greatest modern archer, though Major Hawkins Fisher and Mr. H. H. Palairet have made scores second only to his very best. Mr. Ford has retired from public competition as an archer, after having won the medal eleven times over all the best shots of England. Major Fisher has been awarded the medal five or six times, and Mr. Palairet twice. Mr. Rimington, Mr. Everett, Mr. Muir, and several others have won the medal with high scores. Among the ladies who have won the bracer at the national meetings with very high scores, may be mentioned Mrs. Horniblow, Miss Betham, Mrs. Butt, and Mrs. Marshall. The grand national society has caused a great revival of archery in the three kingdoms. A large number of flourishing clubs have been formed in almost every county, and now there are four great annual prize meetings, including the national, the Crystal Palace, the Leamington, and the grand western, besides a Scotch national meeting. The rule of shooting observed at all the public archery matches is, that a target shall be fixed at each end of the range, at one of which three arrows are discharged by each bowman, when all walk to the other end of the range and shoot back again, and so on until the game is finished.—The oldest and most interesting of the archery societies of Great Britain are: 1. The "Royal Company of Archers," founded in 1676 by an act of the privy council of Scotland. This company has always claimed to be the king's body guard, and has numbered among its members many distinguished men. It is commanded by a captain general. Since its foundation, six earls and six dukes have filled the chief office and presided at the company's deliberations and dinners. In 1703 Viscount Tarbat, afterward earl of Cromarty, obtained a new charter for this society, confirming their franchises and enlarging their privileges. This charter provided a *reddendo* of two barbed arrows to the crown, which was proffered as late as 1842 to Victoria when she visited Scotland. George IV. constituted this company part of the royal household. In 1777 the society erected for itself a most elegant and spacious hall, in which its meetings have ever since been held, and where magnificent banquets are spread for its members and guests. Hard by is their beautiful shooting ground, whereon they compete for some old and exceedingly valuable prizes, among which may be mentioned: £20 annually given by the queen, which is expended by the winner in purchasing a piece of plate; the Musselburgh silver arrow, dating back to 1603; the Peebles silver arrow, 1626; the Edinburgh silver arrow, 1709; a gold medal made of part of the money paid by Tippoo Sultan at the treaty of Seringapatam, 1793; and a silver horn. The company's members shoot at 100, 180, and 200 yards. In the stormy days of the latter part of the 18th century the royal company took an active part in the political broils, adhering to the cause of the exiled Stuarts. This seems to have caused confusion in their records for a time; but when Queen Anne died, and their political party gained new strength, the company revived and forthwith renewed the old customs, and the laws were richly drawn on vellum adorned with festoons of the national thistle and subscribed by all the living members. Speaking of this, Mr. Maitland, in his "History of Edinburgh," says the roll of names filled five columns 14½ feet long. On the first public occasion subsequent to this revival, the company marched in great pomp to Leith and shot for the Edinburgh silver arrow. The earl of Cromarty, then captain general and past 80 years of age, marched on foot the whole distance and stoutly contested for the prize. In 1832, by royal gift, the company came into possession of a stand of colors delivered through the duke of Buccleugh. Besides this, they have two very ancient standards. One grand prize of great age and historic value belonging to the royal company of archers is the silver punch bowl, made of pure Scotch silver and large enough to hold the punch made from two bottles of whiskey. As early as 1793 this prize had been won 73 times, as attested by the attached medals, the first of which bears the inscription, "James, earl of Wemyss, 1720." Peter Muir, a man as celebrated among bow-makers as Antonius Stradivarius among the makers of violins, was fletcher and bowyer to the royal company for more than half a century. Upon his retirement in 1877, a banquet was tendered him at the hall, where many members of the company made speeches and a costly token of their esteem was presented to him. Nearly a hundred years ago the royal company tendered to the woodmen of Arden the freedom of their grounds, by a diploma enclosed in a box of yew. The woodmen responded with a like honor enclosed in a casket of the heart of oak. On July 31, 1878, a detachment of the royal company accepted a friendly challenge from a like number of the woodmen, and shot a match on the latter's grounds, at the distance of 180 yards. The score stood 18 to 4 in favor of the Scotchmen, Brig. Gen. Wolfe Murray and Dr. Argyll Robertson scoring 3 each. The number of arrows shot by each bowman was 18. II. The "Woodmen of the Ancient Forest of Arden," usually called the "Woodmen of Arden." This society is so old that its origin is lost. In 1785 it was revived. Its meetings are held at Meriden in Warwickshire, and its shooting grounds in the Forest of Arden are the finest in England. In 1788 the woodmen employed Signor Benoni, an Italian architect, to plan and build them an archers' hall in their forest; and it has since been greatly added to and beautified, so that now it is one of the most interesting edifices in the kingdom. The grounds of the society consist of twelve acres planted in oak, hickory, yew, and other appropriate trees. In 1814 the number of the society was increased to 80 and there limited. The woodmen have several valuable prizes, the principal of which are: The silver bugle-horn of Arden, presented by the earl of Aylesford in 1787, which is shot for at from 180 to 240 yards; the silver arrow presented by the countess of Aylesford in 1788, shot for at 180 yards; and the Digbean gold and silver medals, presented by W. Digby, Esq., in 1818, shot for at 100 yards. In 1877 the Rev. William Gresley bequeathed to the woodmen three of his best bows, which were shot for at the society's next meeting, and won by Mr. Beck and Mr. Capel. III. The "Royal Toxophilite Society" was founded in 1781 by Sir Ashton Lever, who received the idea from Mr. Waring. The society as now constituted is composed of, or rather represents, two ancient associations, the "Finsbury Archers" and the "Archers' Company of the Honorable Artillery Company." The magnificent shield of silver presented to the last named body by Queen Catharine, several ancient silver arrows, and other old and valuable prizes are held by this society. In 1832 it obtained from the department of woods and forests six acres of ground, upon which it has erected a fine hall at a cost of about $25,000. In 1787 the future George IV. became patron of the society, since when it has been known as "Royal," and the prince of Wales is now its patron. Many men of note have been connected with the royal toxophilites, and their archers have been among the first in Great Britain. Major C. H. Fisher is probably the most noted member of the society as a bowman, but Mr. C. H. Everett, Mr. Palairet, Mr. Rimington, Mr. Butt, and Mr. Walrond have won high honors.—Stimulated by the example of the three ancient societies just described, scores of archery clubs have been instituted and are now in a flourishing condition all over Great Britain, and for some years an "Archers' Register" has been issued annually, giving full details of all the public meetings and of many of the private contests of the various associations. Records thus made public show a rapid increase in the number of practical archers from 1844 down to the present year. There has also been a great growth in the average scores made at the national meetings, showing that many, and not the few, have assiduously trained in the "old and honorable pastime of archering." The following brief tables of scores will give an idea of the rapid improvement made in a few years:

SCORES OF WINNERS OF CHAMPION MEDAL.

DATE OF MEETING.	Place of meeting.	Name of archer.	Hits.	Score.
1844*	York	Rev. J. Higginson	52	221
1845	York	Peter Muir	185	587
1849	Derby	A. P. Moore	178	747
1850	Edinburgh	H. A. Ford	198	899

From 1850 to 1859 inclusive Mr. H. A. Ford won the champion medal each year, three of his scores exceeding 1,000, viz.: in 1854, 1,074; in 1857, 1,251; in 1858, 1,076. In 1867 he made 1,037. In 1878 Mr. H. H. Palairet took the medal with a score of 932. Some of the highest scores of the grand western meeting are:

DATE.	Place of meeting.	Name of archer.	Hits.	Score.
1861	Taunton	J. Edwards	189	897
1868	Teignmouth	H. A. Ford	190	924
1870	Teignmouth	C. H. Fisher	225	1,088
1872	Sherborne	C. H. Fisher	218	1,060
1875	Teignmouth	Mr. Rimington	202	926
1878	Weymouth	Mr. Walrond	175	815

At the annual Crystal Palace meeting, and at the midland counties meeting, the same rapid growth of accuracy and steadiness in shooting has been shown.—Archery in America. Archery was unknown as a public pastime in the United States until the year 1878. In 1879 the "Grand National Archery Association" was founded, and its first public meeting took place at Chicago in August of that year. The double York round was shot for the medal of championship, which was won by Mr. W. H. Thompson with a score of 624. The ladies' medal was awarded to Mrs. Brown for highest score at the double national round, consisting of 48 arrows at 30 yards, 48 arrows at 40 yards, and 48 arrows at 50 yards. Her score was 541. The second place was won by Mrs. Lee with a score of 510. The growth of archery in the United States has been wonderfully rapid. The first private club was formed at Crawfordsville, Ind., in 1875, consisting of three members—H. H. Talbott, Will H. Thompson, and Maurice Thompson. The two last-named gentlemen, however, had been archers for several years, having used the bow and arrows as hunting weapons in many of the finest game regions of the country; and it was owing to the publication of papers by Maurice Thompson in "Appletons' Journal" and "Harper's" and "Scribner's" magazines, on the subject of hunting with the long-bow, and a book entitled "The Witchery of Archery," by the same author, that public interest in the exercise was aroused, and many private clubs were formed previous to the founding of the national association. Closely following the grand meeting at Chicago, which was on the 12th, 13th, and 14th of August, 1879, an eastern archery association was instituted at Boston, and an Ohio state archery association at Cincinnati. Immediately a great interest in bow-shooting sprang up all over the country, and so large was the demand for archery tackle that the sources of supply were speedily exhausted. At the present time there are several extensive establishments in the United States for the manufacture of bows and arrows, and archery clubs exist in most of the eastern, middle, and western states. Owing to the favorable climate of our southern states, doubtless the practice of bow-shooting will there find many followers. In California the pastime was quickly made popular, and some remarkable scores have been made by Mr. Havens of San Francisco.—**PRACTICAL ARCHERY.** Before entering into the details and minutiæ of practical shooting, it will be necessary to describe the tackle.—*The Bow.* All the bows now used are made of wood, and yew, lancewood, snakewood, beefwood, and rosewood are valued in the order stated. For target use, a yew bow is far superior to any other. Spanish and Italian yew are best, though occasionally an excellent bow is made of English yew. In choosing a yew bow, select a light-yellow one which has a long and straight grain with a bright waxy clearness of texture. The fewer the knots and pins the better; but if such defects appear, see that the wood is thicker at these points. A careful bowyer shows great skill in what is termed raising the wood about weak points in the bow. Seasoning yew for bow-making is a very tedious and delicate process, requiring a special knowledge of the effect of heat and moisture on the wood. The best makers season their bow staves four or five years before completing the bow. The wood is all the time kept in a covered place where a current of dry air continually reaches it, and the bow is advanced by slow stages to its final shape. This gives the greatest elasticity to the wood. Bows are of two kinds: one-piece or self bows, and two-piece or backed bows. Usually the best self bows are made of two pieces joined endwise in the centre by a method of dovetailing called grafting, and over this joint the plush handle is placed. The backed bows are made of two pieces of wood glued together lengthwise. Backed bows are quickest of spring, but self bows are most trustworthy under all the exigencies of weather. The inner side of a bow (that is, the side next the string) is convex, and is called the belly; the outside is flat, and is denominated the back. The ends of good bows are tipped with horn, in which are the notches or "nocks" for the string. A gentleman's bow should be from 5 feet 10 inches to 6 feet in length. Six feet is the better length, as then the bow is less apt to break. A lady's bow should be from 5 feet to 5 feet 5 inches long. The value of a fine yew bow varies from $50 to $250, according to the quality of the wood and the reputation of the maker. As with musical instruments, so with yew bows, age gives increasing value. A very old self yew bow, which has been used a great deal, has a peculiar "sweetness" of flexion and a gentleness of recoil much prized by archers. The strength of a bow is measured by the weight in pounds required to draw in it an arrow 28 inches long. The weight of gentlemen's bows varies from 40 to 56 lbs. drawing power. Shooting by the target method, he is a strong man who can effectively use a 50-lb. bow; but an archer of medium power can draw a 55-lb. bow by the hunting method. For target purposes, the medium weapon has a drawing weight of about 46 lbs. A self bow, properly made of good wood, is preferable to a backed one; and a bow which remains slightly bent after unstringing it is safer and better than one which has greater reflexion, since it is less apt to break and does not jar the left arm in shooting. All the old English bows were self ones. Backed bows did not come into use until archery was superseded in war by gunnery. It was when the rigor of the laws relative to the importation of proper bow staves was relaxed, that bowyers began to construct inferior weapons by gluing two kinds of wood together. This innovation was probably begun about the end of the 16th century by the Kensals of Manchester, some of whose bows, made of yew backed with hickory, are still in use. It is agreed by all good archers that the first quality of a bow is steadiness, the second quickness, and the third standing—that is, the quality of retaining its strength uniformly as long as used. These qualities exist almost to perfection in first-rate self yew bows. Dampness is fatal to fine archery tackle, and especially is yew wood sensitive to the least touch of moisture. When not in use, the bow should be carefully kept in a woollen cover, or better, in a well lined ascham.—*The String.* Up to a recent date bow strings of first quality were scarce, the whole supply coming from one Belgian maker. At present, however, very fine strings are made in America and England. The diameter of a bow string should be about one eighth of an inch for its entire length, save 6 inches at each end next the nock loops, where it should be enlarged to double that thickness. Very long-fibred hemp or flax is the best material for bow strings, which should be twisted evenly without doubling, and afterward stiffly waxed. The string at its middle should be wrapped or "whipped" with floss silk a length of 6 inches, and the precise middle should be marked as the nocking point for the arrow. The loops at the ends of the string should be such a distance apart that when the bow is braced this nocking point will stand 6½ inches from the belly of the bow. (See fig. 1.)—*The Arrow.* A perfect arrow is of the highest importance in practical archery. In fact, good shooting depends much more upon the arrow than upon the bow. The wooden staff or shaft of the arrow is called the "stele;" the arrow head, which is usually of steel or iron, is denominated the "pile;" and the end which bears the notch for the string is called the "nock." Many forms of stele or shaft have been tried, but archers have finally agreed that no shape is so good as the stele of uniform size and perfect roundness from pile to nock, though the latter for about one inch tapers slightly down to its end. The nock is usually of horn set into the stele. The best pile is of steel, cylindrical, about an inch in length, and having its sides (or outer surface lines) parallel for four fifths of its length, whence it rapidly tapers to a conical point. All good target arrows have the stele of two kinds of wood, the longer part of red deal, and the shorter part a footing of snakewood, bulletwood, or lancewood, upon which the pile is set. The feathering of an arrow requires great skill in the fletcher. Usually, and for target arrows always, three feathers are used, set upon the stele at an angle of 120° to each other and about an inch from the nock. These feathers, as shown in the engraving, are cut either to the shape of a triangle or that of a figure bounded on one side by a straight line and on the other by a parabola. The latter are called "balloon feathers," and are preferred by some of the best archers. The feathers most highly valued for the vanes of arrows are those of the peacock. Formerly goose and turkey feathers were considered best. Fine arrows are painted usually some bright color between the feathers. The weight of an arrow is expressed by comparing it with that of English silver coin. Gentlemen's arrows usually weigh from 4*s.* 6*d.* to 5*s.*, those of ladies from 3*s.* to 3*s.* 6*d.* Rather heavy arrows are preferred, as giving a steady and uniform trajectory; for the same reason a moderately broad feather is recommended. For a bow of from 46 to 56 lbs. weight, a 5*s.* arrow should be used. Gentlemen's arrows are 28 in. long, those of ladies 25 in.—*The Bracer or Arm-Guard.* This is a piece of smooth, moderately thick leather, sometimes padded and lined with silk, having straps and buckles to fasten it on the left forearm as a protection against the string in shooting. Fig. 2 (5) shows the best form for the bracer.—*The Finger Tips*, or stalls for the three drawing fingers, are made of thin, hard leather, very highly polished. Their purpose is to protect the fingers from the abrasion of the bow string. Formerly leather gauntlets served the archer's turn in the place of these tips; hence all kinds of stalls are called "shooting gloves."—*The Quiver* is a leather pouch for holding the arrows. It is worn at

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* Only the single York round was shot in 1844. The other scores were at the double York round. Mr. Higginson's score, therefore was equivalent to 104 hits and 442 score.

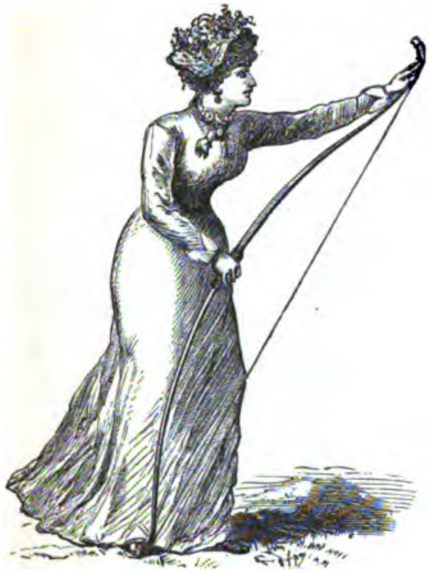


FIG. 1.—Stringing the bow.

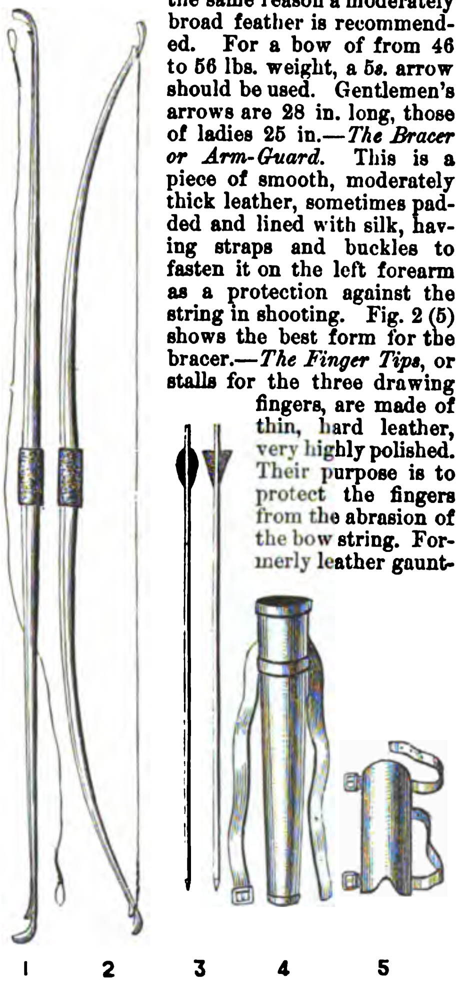


FIG. 2.—1. Bow unstrung. 2. Bow strung. 3. Arrows. 4. Quiver and Belt. 5. Bracer, or Arm-guard.

the right side, where it is held in place by a belt that passes round the waist. Anciently the quiver was carried behind the shoulder. The bowmen of the English army bore their arrows under a belt or in a quiver suspended by a baldric. The quivers used in target practice are made just large enough to hold four arrows easily, three intended for use and the extra one to serve in case of accidental breaking or loss.—*Shooting.* There are two distinct methods of shooting with the bow and arrows—the hunting method and the target method. The hunting method is used in aiming at moving objects, and in shooting game and wild animals. Fig. 3 shows the proper standing of the archer and the best way of drawing the bow in hunting. It is the old English war method also. Shooting by this method enables the archer to use a strong bow and a very long arrow; but in shooting over ranges where the exact distance from the shooter to the target is known, it is not so accurate as the modern target method. In England, where archery has been exhaustively studied for so many years, the best bowmen have accepted the following as the best possible theory and practice of shooting at a target: To stand correctly, fix both feet flatly on the ground, 6 or 8 inches apart at the heels, the toes out slightly. The left side of the archer must be toward the target, his body erect, his face looking over his left shoulder. Standing thus, with his bow grasped firmly in his left hand, he places an arrow upon the string, and draws the string in the position indicated by fig. 4. When the left arm is fully extended, and the right hand has drawn the string to just below the chin, as shown, the arrow and string are loosed at once by slipping the right-hand fingers off the string. This, in brief, is the general theory of target-shooting.—The game of archery is governed by a few very simple rules. A company of ladies and gentlemen arrange themselves into two parties for a trial of skill. Two targets are set up at an agreed distance apart, say 60 yards. A number of arrows, for example six dozen to each archer, is shot. The highest score wins. If two scores are equal, then the greater number of hits wins. A very pleasant game is for each party to aggregate its scores, the higher to win. The first act of the archer is to brace or string the bow. This is done as follows: Grasp the bow firmly at the middle with the right hand, the back of the bow toward the wrist, the lower horn resting in the hollow of the right foot. Place the palm of the left hand against the back of the

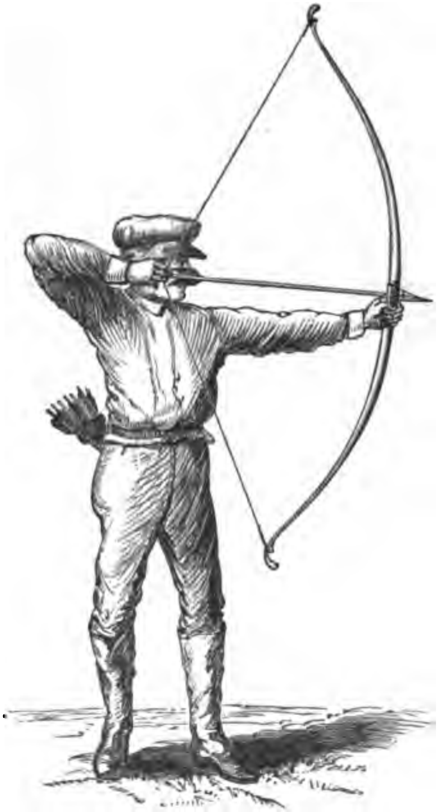


Fig. 3.—Position in hunting.

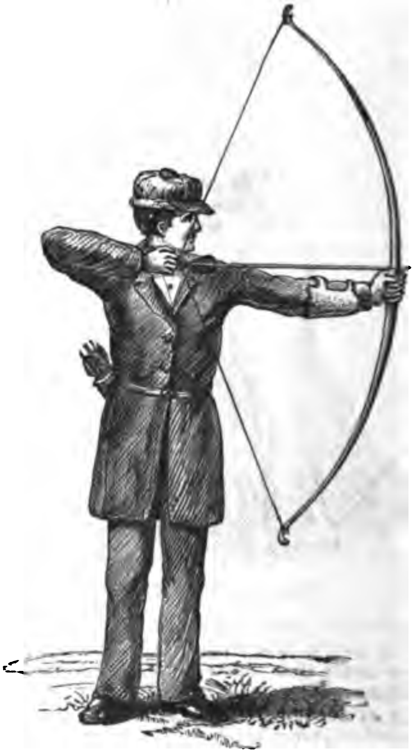


Fig. 4.—Position in target practice.

bow near the upper horn and below the upper loop of the string (see fig. 1); push with the left hand and pull with the right until the bow is sufficiently bent; then, with the left forefinger and thumb, slip the loop up into the nock. It will be understood that when the bow is unstrung the lower loop remains in the lower nock, and the upper loop encircles the bow two or three inches below the other nock. The position for unstringing the bow is precisely that of stringing it, and the loop is slipped out of the upper nock with the left thumb and finger. When a 6-foot bow is strung, the distance between the string and the belly of the bow at the middle ought to be at least 6 inches; many archers prefer it to be 7 inches. The bow being strung and the archer having taken his standing as before described, the next act is to nock the arrow on the string at the point marked for it, so that the "cock feather," or feather at right angles with the nock, is next the right thumb, the first three fingers of the right hand being hooked over the string, the arrow nock resting between the first and second. In this position the stele of the arrow lies across the bow just above and touching the first finger of the left hand, which is closed around the plush handle. The archer is now ready to draw his bow. This is done by steadily extending the left hand and arm, and at the same time pulling back the string with the right. During the process of thus drawing the bow, the left hand is raised until the point of aim is reached. The draw is finished at a point just below the chin, where the string is loosed. In the mean time accurate aim must be taken. The best, and in fact the only scientific method of aiming may be thus described: Draw your bow until nearly four fifths of the arrow is taken up; at this point take sight with your right eye (without closing your left) over the pile of the arrow at an aim which you think of proper elevation; then finish your draw and loose just under your chin. It is not absolutely necessary to pause perceptibly in the draw at the point of fixing the aim, though it is safer to do so. With a 46-lb. bow and 5*s.* arrows, taking aim over the pile when the arrow is four fifths drawn up, and shooting as above, the point of aim at 60 yards is near the centre of the target, at 80 yards a foot or two above the top of the target, and at 100 yards 10 or 12 feet higher. With different weights and strength of weapons the point of aim will vary considerably, owing to the low or high trajectory of the arrows. In aiming, three things are necessary: to know the point of aim—that is, the point to be aimed at in order to give the proper elevation to the arrow; to keep the whole length of the arrow directly in the vertical plane of the right eye; and to preserve rigidly the position of the left hand from the time of fixing the aim to the time of loosing the string. Of course, after aiming, any movement of the left hand, even the slightest, will spoil the accuracy of the shot. What is technically termed the "point of aim" is that point upon which the pile of the arrow is directed, and this will be below or on the gold of the target, or above it, according to the strength of the bow, the weight of the arrow, and the distance shot. The direct vision of the archer in aiming must be immovably fixed on this point, while by a secondary vision he keeps the entire length of the arrow under the right eye. Quitting or loosing the string at the completion of the draw is a most difficult thing to acquire perfectly. It must be done smoothly and steadily, without a jerk and also without a pause, and every time at exactly the same point below the chin. The slightest change in the point of loose will cause a great deviation in the direction of the arrow, and this whether the change be vertical, lateral, or in the direction of the draw. The commonest hindrances to a correct loose are too strong a bow, ill-made finger tips, and a too rapid drawing of the string. Nothing but patient practice with proper weapons can bring success.—From the published authorities, and from the long and careful experimenting of the most successful archers, the following points or maxims have been adopted as the best to be remembered and acted upon by the bowman in training: Hold the bow firmly in the left hand, but do not squeeze it. Keep the right arm, in drawing, on a level with the right shoulder, or nearly so. Always nock the arrow at the same point on the string. See that the arrow always lies straight across the bow, just above and touching the left hand. Draw to a point just below the chin and loose there, neither with a jerk nor a pause, but smoothly. In aiming, keep the whole length of the arrow in view, but at the same time keep the eyes fixed on the point of aim. Take sight with the right eye, without closing the left. In changing the elevation of your shot, do so by lifting or lowering the left arm; the position of the right arm never must be changed, the point of loosing being always the same. Keep the left arm as steady as a vise in loosing. In drawing, slant the bow to the right at an angle of about 20°, and let the drawing motion be rather slow and very steady. Practise regularly, but not too long at a time.—Of the range and trajectory of arrows, much has been written which depends upon legend and tradition, instead of upon scientific demonstration, for its authority. Very simple experiments have proved that no bow, within the power of even a very strong man, can cast an arrow, however light, further than 400 yards. There is no good authority, in fact, showing that this limit has ever been reached with the best flight arrows. A 50-lb. yew bow will, at its furthest cast, throw a 4*s.* 6*d.* arrow of 28 inches in length about 240 yards. An arrow even 36 inches long could not be thrown further than 280 yards. Mr. Ford and Mr. Muir, using powerful bows and exerting their skill to the utmost, succeeded as follows: Mr. Muir, with a 62-lb. yew bow and light arrows, could not quite reach 300 yards. With a Turkish horn bow and flight arrows he finally accomplished 306 yards. The longest range Mr. Ford could reach was 289 yards, though he thought 300 yards possible. In his experiments he found an Italian yew bow of 60 lbs. to bear an arrow further than any other. From the foregoing facts it may be concluded that the heavy war arrows of the middle ages could not be thrown by even the most powerful archers a greater distance than 350 yards. This would not give sufficient force to cause the missile to pierce very heavy armor. The chief difficulty in the way of increasing the range of archery weapons lies in the fact that, as the weight of the arrow is decreased, the power of the bow must also be decreased, or the arrow will be broken by the action of the string. Hence an 80-lb. bow, on account of its requiring a heavier arrow, will shoot little further than a 60-lb. one. The difficulty of loosing properly when shooting a very strong bow also operates to prevent far shooting with it. The feathers of the arrow, too, retard the flight of the missile; but without feathers the flight will be winding and unsteady. Besides, the rotary motion so necessary to secure a perfect trajectory adds greatly to the difficulty of accomplishing long-range shooting. Lastly, target arrows, being pointed, are on this account hindered in their flight, as it has been demonstrated that a truncated missile of any kind will fly further than a pointed one.—*Physical Effects.* Archery has been demonstrated to be a very strengthening and health-giving pastime. Indeed, the revival of archery in the last century had its beginning in the discovery by Mr. Waring that its exercise was extremely beneficial to him. On this subject the "English Bowman" says: "About the year 1776 Mr. Waring, who may justly be styled the father of modern archery, resided with Sir Ashton Lever at Leicester House. Having by continual application to business contracted an oppression upon his chest, he resolved to try the effect of the bow in affording relief. Accordingly he made it a regular exercise, and in a short time derived great benefit from the use of it; and he ascribes his cure, which was perfect, solely to the use of archery. Sir Ashton Lever, perceiving the good effects which so engaging an amusement had upon the constitution, followed Mr. Waring's example, and took up the bow. He was soon joined by several of his friends, who in the year 1780 formed themselves into a society under the title of 'Toxophilites.'" Peter Muir, the greatest Scotch archer, is still living (March, 1880), though past four score years, and he won the championship of Great Britain over all comers when upward of sixty. From information collected by Maurice Thompson, president of the national archery association of the United States, it is shown that in almost every instance where archery is judiciously practised, the archer's girth of chest is increased, and the muscles of his arms, shoulders, back, and breast are hardened and strengthened. But, on the other hand, the exercise may be abused, and in such case will seriously injure the archer's physique. The use of too heavy a bow, or one which kicks or shakes in the left hand, may paralyze the left arm and damage the whole nervous system. Mr. Ford cites a case where dangerous illness of very long duration followed an archer's shooting with a very strong bow. Subsequently, from the same cause, Mr. Ford himself ruined the tendons of the fingers of his right hand, and was compelled to give up archery. A writer in the English "Archery Register" also says that Major Fisher, who next to Mr. Ford is the greatest living archer, has damaged his loosing power by the occasional use of too strong a bow. Mr. Palairet, one of the later English champions, uses light bows, and his shooting shows a high degree of steadiness and power. —*Vocabulary.* The following is a list of technical words and phrases used in target archery, with brief definitions and explanations:

Allow, Allowance, used to express the act of shooting to the windward of the target, in order to compensate for the drifting of the arrow. Allowance is also made vertically when the wind is directly up or down the range.

Ascham, a large wooden case, usually panelled and highly ornamented, and lined inside with velvet or baize, used to hold the archer's bows and other tackle. It takes its name from Sir Roger Ascham.

Back, of a bow, the outer or flat side.

Belly, of a bow, the inner or rounded side.

Bow Arm, the arm in which the bow is held in shooting.

Bow Shot, the distance a bow will shoot an arrow.

Bowman, an archer.

Bowyer, a maker of bows.

Butt, a wall or mound of earth or sods against which is placed a mark to shoot at.

Cast, to, to warp or become set awry.

Cast, the, the right to shoot first, gained by winning at the preceding shot or end, which is called getting the cast.

Chrysal, or *Crysal*, a peculiar pinch, usually in the belly of a bow, caused by an unevenness of texture and density in the wood. It soon spoils the weapon, eating into it like the cut of a very thin saw. It may be remedied when it first appears by wrapping it over very closely with silk thread dipped in liquid glue.

Clout, a small white target, usually placed in a short split stick stuck into the ground.

Clout-shooting, shooting at clouts.

Cock Feather, the feather of an arrow at right angles with the nock.

Compass, to keep, to keep the proper elevation with the arrow in shooting.

Cut. An arrow is said to "cut the gold" when in falling short it appears to cross the centre of the target from top to bottom.

Drawing through the Bow, signifies drawing the arrow so far that its pile falls inside the bow.

Elevation, the height of the bow hand in shooting; also the same as *compass*.

End. the number of arrows shot by each archer at either extremity of the range. Three arrows are usually called an end.

Eye of the string, the upper loop of the bow string.

Fast, a word of caution to an individual about to cross the range. It means "Halt" (*i. e.*, "Stand fast").

Fletcher, an arrow-maker.

Flight, the distance an arrow is shot.

Flight-shooting, a trial of skill in the furthest shooting with a bow.

Flip. An arrow is said to flip when by mischance it falls away from the string and does not receive much force.

Follow. A bow is said to follow the string when it remains partially bent after unstringing it.

Footed. A footed arrow is one having a hard piece of wood set into the end to receive the pile.

Gone. An arrow is gone when from its flight the archer thinks it will go beyond the target.

Grafted. A bow is grafted when made of two pieces joined endwise at the handle. The best self yew bows are made in this way.

He! He! a call, handed down by archery tradition from very ancient times.

Hit, the striking of the target with the arrow in shooting.

Home. An arrow is home when drawn to the pile.

Horns, the horn nocks or tips of a bow.

Inches, a distance or space around the mark on a butt in which an arrow must hit to be counted.

Keeping a Length, shooting just the distance necessary to reach the centre of the target, but mayhap to one side.

Keeping a Line. An archer keeps a line when his arrow flies in the vertical plane of the target's centre.

Kick. A bow is said to kick when its recoil is jarring and painful to the left hand. This fault is common to hard-wood bows of all kinds, and to improperly made yew bows.

Length, the horizontal distance from the archer to the centre of the target.

Limbs, the part of a bow above and below the handle, as the upper and lower limbs.

Mark, any point or object shot at.

Nock, notch of a bow or arrow.

Nocking Point, the place marked on the bow string to receive the arrow's nock.

Noose, the lower loop of the bow string.

Over-bowed, having too strong a bow.

Over-hand, shooting with the aim over the bow hand.

Pair. Three arrows are termed a pair.

Petticoat, or *Spoon*, that part of the target's face outside of the outer counting ring. When this is hit, it counts nothing; but, in merry-derision, the archer making the shot is by an old custom awarded a horn spoon.

Pile, the steel or iron head of an arrow.

Popinjay, a wooden figure of a bird, sometimes shot at in archery matches, especially in France and Scotland.

Quarrel, an arrow or bolt for a cross-bow.

Quiver, a case in which arrows are kept.

Rovers. Shooting at rovers is where the archers walk about and shoot at such marks as they chance to select.

Self Bow, a bow made of a single piece of wood, or of two pieces joined endwise by grafting.

Shaft, an arrow lacking only the head.

Shaftment, the length of space on the arrow occupied by the feathers. Thus, if the feathers of an arrow are two inches long, it has two inches shaftment.

Shoot, or *Shot*, an arrow-shot.

Sinking. A bow sinks when it loses strength. A bowyer sinks a bow by cutting it down.

Snake. An arrow snakes when it glides under the grass.

Standing. A bow is said to stand when it does not sink. An arrow stands when it does not bend or shake with the force of the bow.

Stele, the wooden part of an arrow.

Tab, a flat piece of leather used in place of tips or finger stalls.

Target, a circular mark made of straw and faced with canvas, upon which five concentric circles are painted.

Target Card, a card colored like the target, used for scoring the archers' hits.

Target Ticket, a ticket entitling the holder to compete at a target match.

Under-bowed. Using too light a bow, an archer is under-bowed.

Weight. The weight of a bow is the power in pounds required to draw it the proper distance for shooting. The weight of an arrow is expressed in English silver shillings and pence.

Whipping, the wrapping of a string at the nocking point.

Wide. An arrow is wide when it flies on either side of the mark.

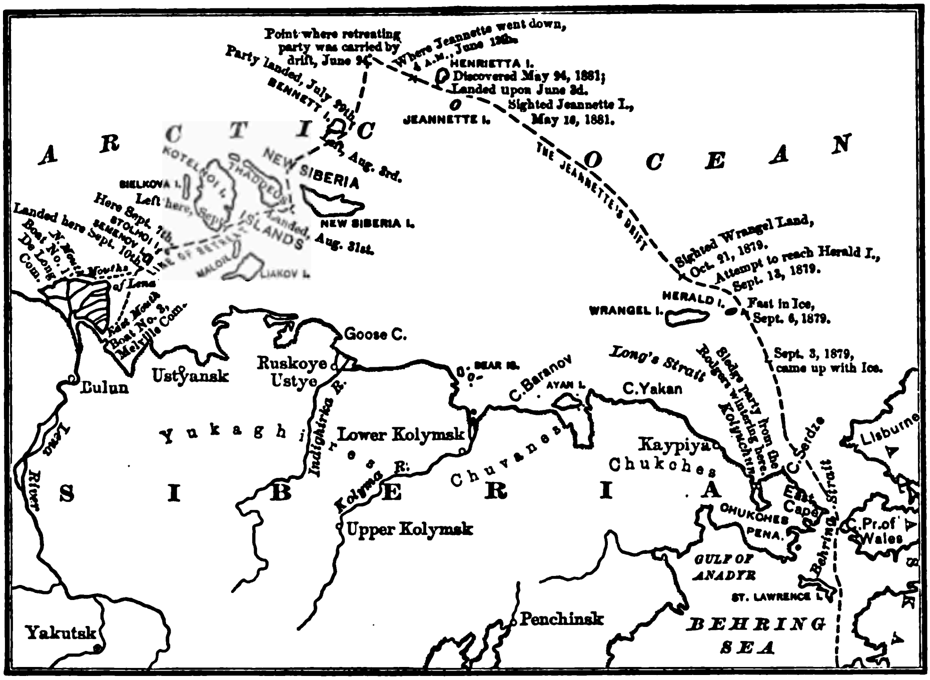
Wind down. The wind is down when it blows from the shooter toward the mark.

Wind side, when the wind blows across the range.

Wind up, when the wind blows toward the archer directly from the mark.

—The catalogue of archery books is large; but, for all practical purposes, the following list will be found to afford most complete historical, practical, and scientific information: "The Book of King Modus" (about the beginning of the 14th century); "Toxophilus," by Roger Ascham (1545); "The British Bowman," by Thomas Hastings; Roberts's "Treatise on Archery;" "Archery, its Theory and Practice," by H. A. Ford (1859); "The Witchery of Archery, a Complete Manual of Hunting and Target-shooting with the Long-Bow," by Maurice Thompson (1878; 2d ed., 1879); "How to train in Archery, a Study of the York Round," by Maurice and W. H. Thompson (1879); "The Archers' Register" (English annual), by James Sharpe; lecture of Sir J. W. F. Herschel (1866); "Accounts of the Royal Toxophilite Seasons" (annual), for the years 1870–'75, '76, '77, by William Butt, Hon. Sec. R. T. S.; "The Book of Archery," by G. A. Hansard (1841). This last mentioned book, although quite worthless for the practical purposes of the target archer, contains a vast amount of historical, antiquarian, and statistical information relative to archery prior to its revival in 1844.

ARCTIC DISCOVERY. Of the recent expeditions toward the north pole, one from which much was expected was that of Capt. (now Sir George S.) Nares, sent out by the British government in 1875. It consisted of two vessels—the Alert, a steam sloop of war of 751 tons, commanded by Commander A. H. Markham, and the Discovery, a whaling steamer of 579 tons, under Capt. H. F. Stephenson—each carrying about sixty men. Capt. Nares had been a mate on board the famous Resolute in 1852–'4, and commanded the Challenger in 1872–'4. The design was that the Discovery should winter in Smith sound, and serve as a relief ship to which retreat might be made in case of necessity; while the Alert should push on as far as possible, and attempt by means of sledges to send out parties to the pole itself. The expedition sailed on May 29, 1875, from Portsmouth, and on July 29 left Cape Foulke, at the entrance of Smith sound. The ice was met off Cape Sabine, and the vessels experienced very great difficulty in making any progress through it. The Discovery was left at the north side of Lady Franklin bay on Aug. 26. The Alert entered Robeson channel (Morton's open polar sea), and succeeded in penetrating 76 miles further, to lat. 82° 27′, where in the middle of September Capt. Nares became convinced that he must winter. He at the same time made up his mind that President Land, which the Polaris company thought had been discovered to the northward, did not exist. In the spring sledging parties were sent out, one of which, under Commander Markham, after an exceedingly laborious journey over the floes, reached 83° 20′ 26″, 70 miles further than Capt. Hall went, and the highest latitude ever trod by man, but still 460 miles from the pole. This party consumed 70 days in its journey, being able to travel at times only a mile a day over the rugged ice. Other sledging parties opened communications with the Discovery, and traced the American shore 220 miles west, and the Greenland shore to a long distance east, without discovering any land northward. From the spot where the Alert wintered the sun was not visible for 142 days. The cold was severest about March 4, when the thermometer marked 74° F. below zero, the lowest record of which there is any authentic account. For a fortnight the mercury was below −59°. Being convinced that he would not be enabled to extend his explorations more than about 50 miles by remaining another season, and his men having suffered severely from scurvy while on sledging parties (four lives were lost altogether, three from scurvy and one from amputation following frostbite), Capt. Nares determined to return, and succeeded in getting out of his moorings on July 31, 1876. A party from the Discovery had meanwhile erected at the foot of Capt. Hall's grave a brass tablet which had been brought out from England. On Oct. 4 the two ships recrossed the Arctic circle, and on Oct. 27 the Alert reached Valentia, Ireland, and Capt. Nares announced to the Admiralty that the impracticability of reaching the north pole had been proved.—In July, 1875, Capt. (now Sir Allen) Young, who was a volunteer in the expedition of Sir Leopold McClintock in 1859, which definitely settled the question of Sir John Franklin's fate, sailed on a private expedition, fitted out partly at his own expense and partly at that of Lady Franklin. His vessel was the Pandora, a bark-rigged steam yacht of 420 tons, purchased of the government, by which it had been built in 1861 for a naval despatch boat. His object was, if possible, to go through the northwest passage by the route which Sir John Franklin took, and incidentally to recover the records which Sir John, it is believed, must have deposited in the vicinity of King William Land. Capt. Young succeeded in getting within 20 miles of King William Land, but at that point found the ice impenetrable, and returned the same season, arriving in England in October. The next year he had intended to renew the effort, but was sent out in the Pandora by the British government with supplies for the Alert and Discovery. These, as it happened, were never received, being deposited at Littleton island, the former camping place of Capt. Buddington, at which place Capt. Nares did not call. The Pandora was afterward sold to Mr. James Gordon Bennett of the "New York Herald," who changed her name to the Jeannette and sent her out on a voyage of discovery by way of Behring strait. She sailed under American colors from San Francisco on July 8, 1879, commanded by officers of the United States navy, at the head of whom were Lieut. George W. De Long and Lieut. Charles W. Chipp, who had considerable arctic experience on board the Juniata in 1873, when she went in search of Capt. Buddington's portion of the Polaris people. In connection with that search these officers made a long boat voyage. The Jeannette's whole company consisted of 31 persons. Their route may be said to have been hitherto untried, as far as purely exploring expeditions are concerned, though the only ship's company that ever passed through the northwest passage entered the arctic regions by Behring strait. It must be remembered, however, that Capt. McClure's people were obliged to abandon their vessel, and accomplished a part of their journey from the Pacific to the Atlantic on foot. The Jeannette passed into the Arctic ocean Aug. 29, 1879, entered the ice within sight of Wrangel island, was caught in the pack, and drifted northward. On May 16, 1881, land was discovered westward, and named Jeannette island. May 24 another island was discovered, and named Henrietta. Here a landing was made, and the island was found to be barren and rocky. Guillemots and murres were seen in great numbers, and there was a little vegetation, mainly lichens and mosses. On the 9th of June the ice opened, but on the 12th it closed again and crushed the vessel. The boats and most of the stores were saved. The crew then started for the mouth of the Lena, over 600 m. distant, by way of the New Siberian islands. The party had 5 sleds packed with provisions, and 3 boats mounted on runners, altogether weighing nearly 8 tons. The effective force was now 22 men, and as all were required to move each sled, the rate of progress was but 1 m. a day. At the end of a week it was found that the drift of the ice toward the northwest had been more rapid than their progress southward, so that they had in reality lost 27 m. On the 12th of July they discovered a new island, which they reached on the 27th and named Bennett island. On its eastern side were grassy valleys, and old deer-horns were found, together with some lignite and specimens of opal and amethyst. The cliffs were inhabited by millions of birds. Here the party remained a week, after which they continued their journey, leaving behind all the sleds except the boat-sleds. Their rate of progress was sometimes 10 m. a day. On the 12th of September the three boats were separated by a gale. The first, commanded by Capt. De Long, landed (as was afterward ascertained) at the northern mouth of the Lena. The second, commanded by Lieut. Chipp, has never since been heard from. The third, commanded by Engineer Melville, because of Lieut. Danenhower's disability from ophthalmia, reached one of the eastern mouths of the Lena on Sept. 17. This party, consisting of 11 men, sailed up the Lena, found 3 native fishermen, and sent despatches to the station at Bulun, farther up the river. Meanwhile, Danenhower vainly searched the delta for the crews of the other two boats. Two men of De Long's party, who had been sent out in search of assistance, were found by the messengers sent to Bulun; and while Danenhower and most of his party made their way homeward by way of Yakutsk, Melville and two men remained behind to continue the search. They found the huts in which De Long had stayed, and some of his records, which were in the hands of natives; but they lost the track, and were obliged to abandon the search for the season. De Long's party had left their boat in the shoals, waded ashore with what they could carry, and with but four days' rations set out for the south. On the 9th of October the two men were sent out for assistance; they fell in with natives who took care of them but were unwilling to go to the relief of the rest of the party. Melville renewed his search in the spring, and found the bodies of De Long and his companions. They had shot some reindeer and other game, had eaten their boots and skin clothing, and lingered till the 30th of October, when the last of them (De Long, Dr. Ambler, and a Chinaman) died. The captain had kept a journal till the last day.—Capt. H. W. Howgate, of the United States army, conceived the plan of establishing a colony of 50 persons on the shore of Lady Franklin bay, near a seam of coal found by the crew of the Discovery. This colony was to be provisioned for three years and furnished with all modern appliances for resisting the cold and overcoming the obstacles in the pathway to the pole; and all means of retreat, except at stated periods, were to be cut off. A subsidiary basis of operations was to be established, if possible, at Cape Union, about 90 m. farther N., between lat. 82° and 83°, and these two points were to be connected by telegraph. Capt. Howgate argued that the colonists could be made as comfortable as the signal service officers stationed on the summits of Pike's Peak and Mt. Washington, would soon become acclimated, and would eventually succeed in accomplishing the long-sought object of reaching the pole. For the purpose of getting things in readiness for such a colony, the little schooner Florence, under Capt. Tyson, of ice-floe fame, was sent north in August, 1877, to collect furs, sledges, &c. It was intended that the colony should go out under Capt. Howgate in the summer of 1878; but he was unable to persuade congress to make an appropriation for the purpose, and the scheme fell through. The Florence passed the winter in Cumberland gulf, collected the desired supplies, stored them at the Danish settlement of Disco, and returned in the autumn of 1878. During her stay in northern latitudes, some scientific work was accomplished by O. T. Sherman and L. Kumlein, respectively the meteorologist and naturalist of the party. —The northeast passage has actually been accomplished by Adolf Eric Nordenskjöld, a native of Helsingfors, Sweden, who has added more to the world's stock of information concerning the Arctic regions than any man of the present, and perhaps of all time. He was originally professor of mineralogy in the university of Stockholm, but has taken part in a large number of exploring expeditions, during which he visited Spitzbergen and proceeded farther into the interior of Greenland than any previous traveller. In 1875, under the patronage of Oscar Dickson, a merchant of Gothenburg, he traversed the sea of Kara, and ascended the Yenisei, thus opening a commercial highway from central Siberia to the Atlantic by the way of the Arctic ocean. The next year he carried a cargo of goods in a steamer from Tromsö, Norway, to the Yenisei, disposed of them, and returned with a cargo of Siberian products. Convinced that it was pos-



sible to proceed even farther along the Siberian coast, and perhaps even to reach Behring strait, on the ground that the three great rivers of Siberia—the Obi, Yenisei, and Lena—must thaw out the ice on the coast by the great volume of fresh water which they pour into the Arctic sea, he secured the sending out of an expedition on a larger scale. Mr. Dickson furnished £12,000 of the £20,000 required; and Alexander Sibiarakoff, a Siberian capitalist, the Swedish government, and King Oscar of Sweden made up the remainder. Among the officers of the expedition were representatives of the Danish, Russian, and Italian navies. Prof. Nordenskjöld's vessel, the Vega, sailed from Gothenburg on July 4, 1878, and at Tromsö was joined by her companion, the Lena. They passed through the Yugor strait, S. of Nova Zembla, on Aug. 1, and found the dreaded Kara sea, known as "the ice cellar of the north pole," clear of ice. A stop of three days was made at Port Dickson, at the mouth of the Yenisei, and the untried part of the voyage then began. Much ice was met, but on Aug. 19 the dreaded North cape, the extreme northern point of Asia, was reached and saluted with a cannonade and a display of colors. The mouth of the Lena was reached on Aug. 26, when the two ships parted company, the Lena ascending the river to Yakutsk, her destination, with the mails. The Vega proceeded, amid constantly increasing difficulties, until Sept. 28, when she became beset, and passed the winter in lat. 67° 7′ and lon. 173° 24′ W., near a Tchuktchi settlement. Game was abundant, and the ship's company was plentifully provided by the natives. The cold during the winter months was intense. After an imprisonment of 294 days, the Vega was released on July 18, 1879, and passed East cape into Behring strait on the 20th. After some further exploration of the Asiatic and American coasts, the Vega arrived at Yokohama on Sept. 2. Not a life had been lost on the expedition, and the ship was in excellent condition. Prof. Nordenskjöld pronounced the voyage from Europe to Asia by the Arctic ocean certain and safe with very little more experience of navigation in the northern seas. The Vega subsequently returned to Sweden by the Suez canal and Mediterranean.—In 1872, and again in 1877, Thomas F. Barry, mate of an American whaler, while at Whale point in Hudson bay, was given some spoons bearing Sir John Franklin's crest, by a party of Nechelli Eskimos, who intimated that there was a cairn containing other Franklin relics, including books, 700 miles off in their country, which was presumably the E. coast of Boothia. Two old Eskimos even professed to have seen in their youth some of the members of the ill-fated crews of the Erebus and Terror. Upon this information a search party, at the head of which was Lieut. Frederick Schwatka, of the United States cavalry, sailed from New York in June, 1878, in the whaling schooner Eothen, Capt. Barry, The search party made their way in sledges from Chesterfield inlet, on Hudson bay, to King William land. They were accompanied by Inuits, and had inured themselves, for their two years' stay in the extreme N., more thoroughly to the life and habits of the Eskimos than any preceding expedition. They traversed 3,250 m., the journey lasting from April 1, 1879, to March 4, 1880. Several corrections in the maps were made, the most important of which were the determination of the course of Back river, which runs northward instead of northeastward, and that of the coast-lines of Adelaide peninsula and King William land, and of the western shore of Hudson bay, which is set down on the maps 2° too far to the W. They discovered on the shore of King William land the graves of some of the members of the crews of the Erebus and Terror, among them that of Lieut. Irving, third officer of the Terror. Fragments of boats and other relics were found, and reminiscences of the Franklin party and of the cairns, which were broken open by the Eskimos, were learned from the natives; and also the fact that all the documentary records had been heedlessly destroyed, except the memorial of Capt. Crozier, which was found by the McClintock expedition in 1859. From the evidence added by the Schwatka expedition to that previously obtained, the story of the retreat and sufferings of the Franklin expedition is ascertained with a fair degree of accuracy. Under Capt. Crozier they began their march down the W. coast of King William land on the 26th of April, 1848. Their course was directed to Back river. The crews were much weakened by scurvy, and lumbered with boats and stores. Hunger added its ravages to those of disease, and their route is traced by the graves of their dead, which they marked with heaps of stones as long as they had strength. They were succored for a time by Eskimos, but were deserted at Washington bay. A detachment, headed probably by Irving, attempted to return to the ships which were abandoned in the ice, either to bring stores or to take their chances for safety on board. One of the vessels floated to the shore of Adelaide peninsula, and sank the following summer. The main party pursued their journey southward until they reached Simpson strait, too late to cross on the ice. A part of them attempted to cross in a boat, but were driven back and cast ashore near Pfeffer river. The last survivors crossed in the following winter, but only to perish at the place called Starvation cove.

ARIZONA, a territory of the United States, bounded N. by Utah, E. by New Mexico, S. by Mexico, and W. by California and Nevada; area, 112,920 sq. m.; capital, Prescott. The pop. in 1860 was 6,482; in 1870, 9,658; in 1880, 40,440, of whom 24,391 were native and 16,049 foreign born, 1,630 were Chinese, and 3,493 civilized Indians. The population by counties in 1880 was as follows:

COUNTIES.	Population.	COUNTIES.	Population.
Apache	5,283	Pinal	3,044
Maricopa	5,689	Yavapai	5,013
Mohave	1,190	Yuma	3,215
Pima	17,006		

In 1881 the following counties were created: Cochise, with county seat at Tombstone, from Pima; Gila, from Maricopa and Pinal; and Graham, from Apache and Pima. Tucson, the former capital, had a pop. in 1880 of 7,007. The receipts into the territorial treasury during the years 1881 and 1882 were as follows: General fund, $74,576.85; school fund, $28,889.29; territorial prison sinking funds, $46,226.04; total, $149,692.18; disbursements, $112,945.17; balance in treasury Jan. 1, 1883, $36,747.01. The territorial indebtedness amounts to $297,631.80, viz.: outstanding warrants, $162,631.80; part due interest (estimated), $25,000; outstanding bonds, $110,000. The expenses and the indebtedness have increased largely during the past two years. The legislature, in March, 1883, passed an act providing for the issue and sale of not exceeding $260,000 of the bonds of the territory, bearing interest at 7 per cent., the proceeds of which are to be used in the payment of outstanding warrants and for other purposes. The chief features of the recent history of Arizona have been the completion of the Southern Pacific railroad through the territory, and the progress of mining. According to the census of 1880, the value of farms was $1,127,946; bushels of barley raised, 239,051; Indian corn, 34,746; wheat, 136,427; Irish potatoes, 26,249; wool, 318,698 pounds; value of live stock, $1,167,989; number of horses, 6,798; cattle, 44,983; sheep, 76,524; estimated value of all farm productions, $614,827; value of manufactures, $618,365; silver mined, $2,325,825; gold mined, $211,965. The following table gives the mileage of railroads in the territory at the beginning of 1882:

COMPANIES.	Miles.
Atlantic and Pacific	153
Southern Pacific	384
New Mexico and Arizona	20
Total	557

The Atlantic and Pacific railroad, in course of construction, follows the 35th parallel route across the Colorado plateau region, with a branch running N. W. to San Francisco. At Yuma the railroad connects with a line of packets carrying freight up and down the Colorado river, sometimes as far as Callville in Utah, but in general no higher than Fort Mohave. The mining camps and settlements of Yuma co., north of the Gila, and of Mohave co. entirely, as well as portions of Yavapai co., are supplied with a means of transportation by the river route. A daily stage line runs from Yuma N. E. to Wickenburg, where it connects with the daily stage from Maricopa, an important railroad station on the Southern Pacific. Prescott, the territorial capital, and the county seat of Yavapai co., has daily and less frequent stage and mail communication E. to Fort Wingate, New Mexico, and N. W., passing Mineral Park, Cerbat, Virginia, and Signal, to Fort Mohave on the Colorado river. From Maricopa the stage route passes through Phœnix and Wickenburg, and within a short distance of important mining districts. From Wickenburg it passes across the Antelope range, and opens up several small mining camps and sub-alpine valleys well adapted for farming. The Salt river valley, the chief centre for wheat-farming, has increased in prosperity and population.—Mining is the chief industry of northern Arizona. The principal districts are centred around Prescott, and farther to the N. W. at Mineral Park, Cerbat, Wallapai, and Signal. Eastern capital is finding its way there, and the reduction facilities are being largely increased. A route has been laid out, and work begun under the stimulus of a legislative subsidy of $250,000, for a road from Maricopa N. to Prescott and Mineral Park. The larger portion of more recent activity and development has centred in the central and southeastern portions of Pima co. Tucson has more than doubled its population since the Southern Pacific railroad crossed the Colorado river in 1877. Mohave co. has been the scene of the most continuous American mining, California having supplied the hardy adventurers, who, since 1856, have never ceased to struggle to develop the mines of northern Arizona. Pima co., however, has been the seat of the most notable efforts, both Spanish and American. In the Santa Rita, Atascosa, Patagonia, Baboquivira, and Oro Blanco ranges are to be found abundant proofs of the long-continued though not deep mining pursued under direction of the Catholic missionaries. Tucson, which was a Spanish presidio in the 17th century, and for which a much older claim is made, marks the northern limit of Spanish occupation and Catholic zeal and settlement in this territory. South of Tucson are found the ruined pueblo of Tubac and the ruins of several missions. At the beginning of 1880 the whole of this county was teeming with activity. Tucson claims 8,000 inhabitants, one half at least being American, the remainder of Mexican origin. It has two daily and two weekly newspapers, one being printed in Spanish. There are two banks, two hotels, a large number of stores, and six stage lines and routes. The chief mining districts are the Tombstone, 70 m. E.; the Dragoon, 18 m. N. and E. of the last named; the Dos Cabezas, still farther E. and within a few miles of Apache pass; the Patagonia, Belmont, Washington, Huachuca, Mule Mountains, San José, Arivaca, Oro Blanco, Baboquivira, San Xavier, Aztec, and Tyndall, all to the S. and W. of Tucson. The largest production is from the Tombstone district.—Five daily papers are published in the territory.—The southwestern portion of the territory is known to American history as the

Gadsden purchase, to Spanish and Mexican annals as the Primera Alta, and to the Indians and other residents as the Papagueria. It is an extended plateau, broken by a few parallel ranges of volcanic mountains, having a nearly uniform position of N. W. by S. E. The central portion of this arid quaternary plateau was long inhabited by the Papago Indians, who are now gathered on a reservation 8 m. directly S. of Tucson. These Papagos were found by the Catholic missionaries (Dominicans and Jesuits, from 1540 down to 1780) living in villages and painfully cultivating their small parcels of corn, by bringing water often a long distance and pouring it by measure into little hollows formed in the hot soil at the root of the plant. The Papagos are a branch of the Pima Indians, who still live on and cultivate the land upon the Gila river, where they were found by Padre Marco de Niza, the priest upon whose report Coronado was subsequently sent by Cortez's successor, the viceroy Mendez, to capture, in 1540, the seven famous but somewhat mythical cities of Cibola. The conversion to Christianity of the Papagos was the first substantial victory won by the Spaniards. They have remained faithful to this day, and their simple, industrious, chaste lives and habits are a testimonial not to be disregarded. For 200 years the courage of the Papagos and Pimas has been exercised against the Apaches, and it is due to them that this territory was not long since depopulated.—The population of Tucson in 1880 was 7,007. See map in supplement to Volume III.

ARKANSAS. The federal census of 1880 shows the population of this state by counties to be as follows:

COUNTIES.	POPULATION.			COUNTIES.	POPULATION.		
	Aggregate.	White.	Colored.		Aggregate.	White.	Colored.
Arkansas	8,038	4,971	8,067	Lee	18,288	4.188	9,150
Ashley	10,156	5,026	5,130	Lincoln	9,255	4,212	5,040
Baxter	6,004	5,959	45	Little River	6,404	8,064	8,335
Benton	20,828	20,167	123	Logan	14,885	13,901	934
Boone	12,146	12,058	88	Lonoke	12,146	8,143	4,003
Bradley	6,285	4.075	2.210	Madison	11,455	11,331	124
Calhoun	5,671	8,588	2,088	Marion	7,907	7,864	43
Carroll	13,337	13,272	60	Miller	9,919	5,824	4.595
Chicot	10,117	1,563	8,495	Mississippi	7,332	4,671	2.654
Clark	15,771	10,567	5,208	Monroe	9,574	4,365	5,209
Clay	7,213	7,191	22	Montgomery	5,729	5,471	258
Columbia	14,090	8,587	5,503	Nevada	12,959	9,236	8,723
Conway	12,755	9,546	8,206	Newton	6,120	6,115	5
Craighead	7,037	6,776	261	Ouachita	11,758	5,504	6,253
Crawford	14,740	13,332	1,392	Perry	8,872	8,072	800
Crittenden	9,415	1,899	7,516	Phillips	21,262	5,444	15,809
Cross	5,050	3,261	1,789	Pike	6,345	5,951	392
Dallas	6,505	4,299	2.206	Poinsett	2,192	1,902	290
Desha	8,978	2,452	6,514	Polk	5,857	5,792	61
Dorsey	8,370	6,011	2,829	Pope	14,322	13,418	909
Drew	12,231	6,473	5,759	Prairie	8,435	5,691	2,784
Faulkner	12,786	11,368	1,418	Pulaski	32,616	17,667	14,921
Franklin	14,951	14,455	498	Randolph	11,724	11,097	627
Fulton	6,720	6,634	86	St. Francis	8,889	4,921	8,467
Garland	9,023	7,457	1,562	Saline	8,958	7,586	1,366
Grant	6,185	5,629	556	Scott	9,174	9,085	83
Greene	7,480	7,405	75	Searcy	7,278	7,262	16
Hempstead	19,015	9,598	9,421	Sebastian	19,560	17,970	1,541
Hot Spring	7,775	7,030	745	Sevier	6,192	5,088	1,096
Howard	9,917	7,409	2,508	Sharp	9,047	8,871	176
Independence	18,086	16,703	1,882	Stone	5,089	4,984	99
Izard	10,857	10,635	222	Union	13,419	6,985	6,434
Jackson	10.877	8,118	2.768	Van Buren	9,565	9,447	118
Jefferson	22,386	5,331	17,011	Washington	23,844	22,894	944
Johnson	11,565	11,073	491	White	17,794	15,761	2,032
La Fayette	5,730	2,116	8,614	Woodruff	8,646	4,163	4,483
Lawrence	8,782	8,315	467	Yell	13,852	12,738	1,118
The State					802,525	591,531	210,666

Of persons 10 years of age and upward, 153,229, or 28·8 per cent., were unable to read, and 202,015, or 38 per cent., were unable to write, of whom 97,990, or 25·5 per cent., of that class were native whites, and 103,473, or 75 per cent., of that class were colored. There were 136,150 white and 46,827 colored males 21 years of age and over. The yield of cotton, according to the census, was 608,256 bales; of corn, 24,156,417 bushels; of oats, 2,219,822; of wheat, 1,269,730. There were on farms 146,333 horses, 87,082 mules and asses, 25,444 working oxen, 249,407 milch-cows, 433,392 other cattle, 246,757 sheep, and 1,565,098 swine. The number of manufacturing establishments was 1,202, having a capital of $2,953,130, employing 4,556 hands; value of materials used, $4,382,080; value of products, $6,756,159. The completed railroads within the state included 1,262 m. of standard gauge, and 510 m. of narrow gauge.—In March, 1882, a bill was filed in the United States circuit court for the Eastern District of Arkansas, in the suit of William H. Tompkins (of New York) against the Little Rock and Fort Smith railroad company, which raises the question of the liability of the railroad companies for the "railroad aid bonds" issued to them by the state. The complaint may be summarized as follows: 1. That the bonds were issued by the state with the distinct understanding that the roads were to pay them. 2. That, notwithstanding the road has changed its name, the liability still exists. 3. That, although the supreme court of the State of Arkansas has declared the act under which the bonds were issued unconstitutional, yet the roads received the bonds, sold, endorsed, and received the money for them — they became commercial paper, and therefore the roads are responsible for their payment. — The railroad company entered a general demurrer to the bill, alleging as grounds, among others, that the present owners of the road are not liable for the payment of the state aid bonds, because they are purchasers without notice; and that the act of 1868 is void, under which the bonds were issued.—A new insane asylum, near Little Rock, was completed in 1881; and in the same year a university under Methodist control, was opened.—The population of Little Rock in 1880 was 13,138. See map at beginning of this supplement.

ARMSTRONG, John, an American soldier, born in Pennsylvania about 1720, died in Carlisle, March 9, 1795. As colonel of the Pennsylvania troops he commanded in 1756 an expedition against the Indians at Kittanning. He destroyed the village, and carried off the stores with which the Indians had been supplied by the French. For this exploit the city of Philadelphia gave him a vote of thanks and a medal. He was commissioned brigadier general in the continental army in March, 1776, and served with distinction at the defence of Fort Moultrie and in the battles of the Brandywine and Germantown. He was a member of congress in 1778–'80, and again in 1787–'8.

ARMY WORM (*leucania unipuncta*), an insect originally described by the English entomologist Haworth in 1810, from a specimen found in an English collection, as *noctua unipuncta*, and sometimes referred to by later writers as *heliophila unipuncta*. The identification of the "northern army" of 1770 and the "black worm" of 1817 with the species of Haworth was first made by Dr. Fitch in 1861. It ranges from Maine to Texas, but its more serious depredations occur within the limits of wheat cultivation, between lat. 37° and 47° N. In its perfect state it is a moth, belonging to a principal family of the *lepidoptera* known as the *noctuidæ*, from their habit (with a few exceptions) of flying during the night. The moth is of medium size (see fig. 1), and is quite inconspicuous in its modest yellowish drab color and simple markings of a curved line of black dots upon the veins near the hind margin of the front wings, a dusky streak running from the upper part of this line to the tip of the wing, a small white spot at the forking of the middle vein of the wing, above this a larger pale yellowish spot, and a similar one nearer to the base of the wing. The white spot gives to the species the name of *unipuncta*. The wings are long and narrow, and quite oblique in the curve of their hind margin. The hind wings are short, broad, thin, of a pale dusky shade, and the margin is slightly excavated near its middle.

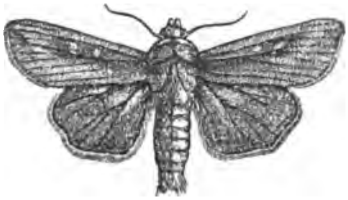


FIG. 1.—Moth.

The abdomen is slender and tapering. The thorax is robust, and bears in front a prominent collar, which is triangular above. The caterpillar from which the moth is produced measures, when full grown, from an inch and a half to two inches in length. Its body is cylindrical, somewhat contracted at the extremities, and has short hairs sprinkled over it. In color it varies from almost black to greenish or olive or dark gray, and is marked with two lateral stripes, the lower one reddish and the upper one traversed by a yellowish central line. It has 16 legs, the 10 abdominal ones marked on the outside by black. The head is brownish and reticulated, and bears some hairs longer than those of the body. The caterpillar is represented in fig. 2, after Riley. The transformations of the insect, as recorded by Prof. C. V. Riley, to whom we are indebted for most of our knowledge of its life history, are as follows: During April and May in Missouri and Illinois, and in June in New York and Massachusetts, about the time of the starting of vegetation, the eggs are deposited by the moths which have survived the winter. The usual place for their deposit is in concealment between the sheath and stalk of grasses, arranged in rows of from 5 to 20; but when the moths are very abundant, the eggs are placed openly upon the edges of the grasses and the margins of the leaves of clover. If the weather is favorable, the eggs hatch in about ten days. The young caterpillars begin feeding vigorously almost as soon as they emerge, and increase rapidly in size, undergoing five moultings, at intervals of from three to five days; and within a month (usually from 25 to 30 days) they attain their growth. They then enter the ground to a moderate depth —sometimes just beneath the surface—and,

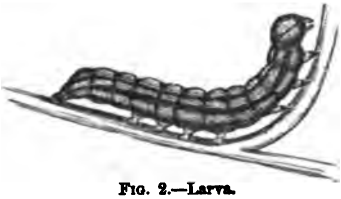


FIG. 2.—Larva.

throwing off their outer skin, change to the pupa state. The pupa is of the usual noctuid form, of a mahogany color, about three fourths of an inch in length. In from two to three weeks this stage is completed, and the perfect insect, or moth, is produced.—The natural habitat of the army worm is in low grass lands. It also feeds readily upon the different grains. Dr. Fitch represents it as an excellent botanist, knowing perfectly well what plants belong to the natural orders *gramineæ* and *cyperaceæ*, which they will eat in preference to everything else; but when pressed with hunger, and not finding any grass or grain, they eat other vegetation slightly, but evidently without relish. The army worm rarely obtrudes itself upon public attention until it is about one third grown and has attained a length of half an inch, at which time, if it occurs in large numbers, it has entirely destroyed the grass where the eggs were deposited, and is compelled to migrate to new feeding grounds. In the march, all move in a solid body and in one direction, justifying the popular name. Concealing themselves during the heat of the day, closely packed together beneath sticks, stones, grass, &c., they come forth toward sunset to feed and to continue the devastating march. Entering upon a field of tender grass or grain, they consume every blade and stalk, even to the roots. Their progress is as marked as the course of a fire which has swept over a dry pasture. "They keep together like an army of soldiers, and usually advance in a straight line, not swerving from their course to avoid hills, hollows, buildings, or any other obstacle. A stream of running water even does not cause them to deflect from the line of march. They crowd into it, and millions are drowned, their dead bodies clogging and damning up the stream in places below, producing by their decay a most noisome and intolerable stench." (Fitch.) In extensive invasions, the front of the army has a breadth of two or three miles, advancing at a rate of six miles a day. If the march be intercepted by furrows in ploughed land, they soon fill them in solid mass, and even fill deep trenches dug to arrest them. A writer narrates that in the invasion of 1770, in New Hampshire, "they went up the sides of houses and over them in such compact columns that nothing of the boards or shingles could be seen." The march continues for two weeks and over, when it is suddenly arrested by the disappearance of the hosts, the caterpillars entering the earth for their pupation.—The earliest record of the army worm is that of an invasion in parts of Massachusetts in 1743. In 1770 it spread over a large portion of New England, occasioning serious alarm and great pecuniary loss; and it again appeared in most of the eastern states and New York in 1790 and 1817. In 1861 another invasion occurred, extending over most of the northern and middle states, and reaching westward into Kansas. In 1872 it infested portions of the United States from New York to Missouri. The year 1875 was another army-worm year, when it abounded from New Brunswick to Missouri; and in 1880 occurred another notable irruption in portions of Maryland, Delaware, and the southeastern counties of New York. The above are the principal army-worm invasions on record; and the irregular periods at which they occur illustrate the well known harmlessness of many insects for a term of years, and their sudden appearance as most serious pests, without any satisfactory explanation. Careful observations and study of records have shown that wet summers succeeding dry ones are those most favorable for these visitations. —As preventives to the ravages of this insect, grass and other lands where it has appeared in unusual numbers may be burned over in the autumn to kill the pupæ, which are buried in the ground near the surface. Swampy grass tracts that have become dry from unusual drought should be examined during June and burned over, if the caterpillars are found therein. When it can be ascertained that the eggs in number have been deposited upon the grass in the spring, the field should at once be ploughed, to prevent the hatching of the eggs. As the most effectual means of arresting the march of the caterpillars, deep trenches may be dug, in which they will accumulate by millions and may be easily destroyed. Furrows may also be made by the plough, through which, when the caterpillars have collected therein, brush may be drawn to crush them. In the fields where they terminate their march and enter the earth for pupation, great benefit has been found from turning in hogs to root them up and eat them. Several species of birds, dragon flies, caterpillar beetles, and ants are serviceable in the destruction of the army worm. The most efficient agents in the prevention of its increase to an insufferable extent are the several parasites which prey upon it. Foremost among these is a fly, resembling the common house fly in form, but larger—the *exorista militaris* (Walsh). Its popular name is the red-tailed tachina fly, derived from the group to which it belongs and the red tip of its abdomen. In army-worm invasions, these flies may usually be observed hovering over the caterpillars in such numbers as to produce a humming sound like that of a swarm of bees, and alighting upon them from time to time to deposit their eggs, which are attached by a cement to the surface, always on the front segments. These eggs hatching shortly, the grubs from them enter the caterpillars, feed upon them, and thus prevent their transformation to the pupa state. Besides this serviceable parasite, six other species are recorded.

ARNIM, Harry von, count, a German statesman, born in Pomerania in 1824, died in Nice, May 19, 1882. He was adopted by his uncle, who at that time was minister for foreign affairs, and early entered the diplomatic service. In 1864 he was envoy to Rome, and gained celebrity by his attitude toward the Œcumenical Council. He was summoned to Versailles in 1871, to aid in settling terms of peace with the French, and took a leading part in the negotiations which resulted in the Treaty of Frankfort. In June, 1872, he was appointed ambassador to Paris. Differences of opinion, which had long existed between him and the German chancellor, led to his recall and assignment to Constantinople, in April, 1874. The publication of his Roman despatches caused his dismissal from the service. The polemical discussion to which he challenged Prince Bismarck was answered by his prosecution and sentence to imprisonment on the charge of having filched state documents from the archives of the German embassy at Paris. He had previously removed himself beyond the jurisdiction of the German courts. An anonymous pamphlet, in which he sought to trace evidences of the personal spite of the chancellor in his former prosecution, led to a new indictment, and his sentence to five years of penal servitude. In pamphlets published in 1878, he criticised the aggressive policy of the German government against the Catholic church, arguing that Prussia should have aimed to establish a national Catholic church in Germany. Afterward he desired to return to Germany and stand his trial for high treason, but the authorities refused to appoint a new trial.

ARNOLD, George, an American poet, born in the city of New York, June 24, 1834, died at Strawberry Farms, N. J., Nov. 9, 1865. While he was still an infant his parents removed to Illinois, where his boyhood was passed till in 1849 they settled at Strawberry Farms. He showed some talent for drawing, and at the age of 18 was placed in the studio of a portrait painter in New York. But he soon abandoned the idea of becoming an artist, and devoted himself to journalism and literature as a profession, producing stories, poems, sketches, and art criticisms for the newspapers and periodicals. His reputation as a humorist was won by his "McArone" papers, which were begun in "Vanity Fair" in the autumn of 1860, and continued in that and other periodicals till the time of his death. His collected poems were published posthumously (2 vols., Boston, 1866–'7), with a memoir by William Winter.

ARNOLD, Isaac Newton, an American author, born in Hartwick, N. Y., Nov. 30, 1815. He studied law, settled in Chicago in 1836, became prominent as a politician, and served several terms in the legislature. He was elected to congress in 1860, and re-elected in 1862. In 1865–'6 he was sixth auditor of the United States treasury. He has published a "Life of Abraham Lincoln" (Chicago, 1866), and "Life of Benedict Arnold" (1879). The latter work, while acknowledging the enormity of Arnold's treason, is in other respects vindicatory and laudatory. The author claims no relationship with his subject.

ARNOLD, Samuel Greene, an American historian, born in Providence, R. I., April 12, 1821, died there, Feb. 18, 1880. He graduated at Brown university in 1841, and at the Cambridge law school in 1845, and settled in Providence. After travelling extensively in Europe and the East, and in South America, he was elected lieutenant governor of Rhode Island on the whig ticket in 1852, and again in 1861 and 1862. He was a delegate to the peace convention of 1861, and, on the breaking out of the civil war, entered the national service in command of a battery of artillery. In 1862 he was sent to the United States senate to fill out the term of the Hon. J. F. Simmons, ending in March, 1863. He published numerous addresses and essays, and a "History of Rhode Island" (2 vols., New York, 1859–'60).

ARTHUR, Chester Alan, twenty-first president of the United States, born in Fairfield, Vt., Oct. 5, 1830. He is the son of a Baptist clergyman who emigrated from Ireland at the age of 18, published "The Antiquarian" for several years, and was the author of "Family Names" (New York, 1857). The son was graduated at Union college, Schenectady, in 1848, taught school in Vermont, was admitted to the bar in 1853, and settled in New York city. His first notable case was the Lemmon slave case, in which he was the attorney for the people, the Hon. William M. Evarts being the leading counsel on the same side. They maintained that eight slaves, with whom Jonathan Lemmon, of Virginia, attempted to pass through New York, were rendered free by the act of the master in voluntarily bringing them into free territory; and on the successive appeals this view was sustained. In 1856 Mr. Arthur was counsel for a colored woman who had been expelled from a street car in New York because of her color, and obtained a verdict against the company, whereby the equal rights of colored people in public vehicles were established. He has been widely known as an active and influential politician from the first organization of the republican party. In January, 1861, he was appointed by Governor Morgan engineer-in-chief, and a year later quartermaster general of the state forces, holding this office till Jan. 1, 1863. He conducted the duties of his office, in equipping, supplying, and forwarding the immense number of troops furnished by his state, with such success that his accounts were audited and allowed at Washington without deduction, while those of some of the states were reduced by millions of dollars. It has also been said that, while he had the giving of many large and profitable contracts, and the control of enormous purchases, he left the office of quartermaster general poorer than when he took it. In 1862 there was a secret meeting of loyal governors, to discuss measures for providing troops, at which Mr. Arthur was present by invitation, being the only person taking part who was not the governor of a state. Many instances are related of the notably vigorous administration of his military office. In 1863 Gen. Arthur returned to the practice of law, and built up a large business in collecting claims against the government. He also drafted many important measures of legislation, and promoted their adoption both at Washington and at Albany. For a short time he was counsel of the New York board of tax commissioners. Meantime he took an active part in local politics, and became known for his skill as an organizer and manager. He was collector of the port of New York from November, 1871, till July, 1878, when he was removed by President Hayes. Two special committees investigated Mr. Arthur's administration of the collector's office, and reported nothing on which a charge of official dereliction could be based. Both the president and the secretary of the treasury, in connection with his suspension, acknowledged the purity of his official acts. A petition for his retention in office, signed by all the judges of the New York courts, most of the prominent members of the bar, and nearly all the importing merchants of the city, was suppressed by Mr. Arthur himself. The only accusation made against him was that of disregarding the president's order in respect to active participation in political management. In a letter to Secretary Sherman he produced figures showing that in the six years of his administration as collector of New York, removals from subordinate offices amounted to only 2¾ per cent. of the whole number, against an average of 28 per cent. under his three immediate predecessors, and that all but two appointments in one hundred to important positions, commanding a salary of $2,000 and more, had been made by promotion from the lower grades of the service, on recommendation of the heads of bureaus. After his removal from office he resumed his law practice. The republican national convention which met in Chicago, in June, 1880, nominated Gen. Arthur, without opposition, for vice-president, and he was elected in November. In the contest between the president and Senator Conkling in regard to appointments in the state of New York, the vice-president took no part, but, after the resignation of the New York senators, he went to Albany and actively participated in the effort to secure their re-election. On the death of Garfield, Sept. 19, 1881, Arthur became president. He requested the members of the cabinet to retain their places; but Secretary Windom, of the treasury, resigned, and was succeeded by Charles J. Folger, of New York. Subsequently, Secretary of State Blaine resigned, and was succeeded by Frederick T. Frelinghuysen, of New Jersey; Postmaster General James resigned, and was succeeded by Timothy O. Howe, of Wisconsin, who died in office in 1883, and was succeeded by Thomas C. Gresham, of Indiana; Secretary of the Navy William H. Hunt resigned, and was succeeded by William E. Chandler, of New Hampshire; Attorney-General Wayne MacVeagh resigned, and was succeeded by Benjamin H. Brewster, of Pennsylvania.

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